

CLIFFS OF DOVER

IL-2 STURMOVIK

PILOT'S NOTES

Special Edition



INDEX

Welcome	7
Installing the game	8
Launching the game.....	8
Options.....	9
Realism.....	9
Video	16
Sound	20
Controls	20
Plane	46
Tactical Markings	48
Loadout – Weapon sets.....	54
Loadout – Guns	56
Loadout – Bombs.....	59
Pilot.....	60
Flying the planes	62
Basics of fight	62
Pilot controls	68
Other crew members.....	76
Gunner controls	77
Bombardier	79
Spitfire	83
Hurricane.....	85
Bf-109	89
Ju-87	94

INDEX

Playing the game	99
Training.....	99
Single Player	99
Multiplayer	100
Full Mission Builder.....	102
Strategy and Tactics	107
Technical support	118
Warranty.....	119



Il-2 Sturmovik • Cliffs of Dover



Welcome

Hello, pilot! On behalf of the entire development team we'd like to welcome you to our new flight simulation. If you've played our previous titles you know what to expect. If you haven't, we're hoping that all our hard work has paid off and you will find the game both challenging and rewarding.

This game was nearly five years in the making. If you count our previous titles, most of us have been building flight simulations since 1998, or for almost thirteen years! We've made the Il-2 series the most successful, the most award-winning, the most famous flight simulation of the 21st century. We hope to continue that tradition after Cliffs of Dover. We're planning to release a series of sequels that will take you to new aerial conflicts during WWII and even beyond. Your purchase of this Special Edition will help us realise that dream.

The flight sim we've built in Cliffs of Dover is much bigger than anything we've built before. We made it more realistic in every respect: graphics, plane models, physics, aerodynamics, weapons, customisability, and more. We've also worked very hard to make it more accessible. With interactive training and comprehensive Realism options we really hope that even those players who have never tried a flight sim before will find it easy to get into and start on a long path to online domination.

Finally, don't forget that the main reason our flight sims have been so popular is our close-knit friendly community. We also love to interact with the community and keep everyone up to date on our development progress. Visit our official site and the forums for news, updates, and great player-made content! And thank you once again for supporting the WWII flight simulation genre!

Ilya Shevchenko

Lead Development Producer

INSTALLING THE GAME

Insert the game disk and follow the on-screen instructions.

NOTE: Cliffs of Dover requires several external components to run, including Steam, Microsoft .NET Framework and Microsoft Visual C++ Redistributable, as well as Microsoft DirectX. All of these components are bundled with the game installation and should install automatically. Should you encounter any problems installing those components, please contact Technical Support for assistance.

LAUNCHING THE GAME

The game requires the Steam service to run. Please make sure Steam is installed and running prior to launching Cliffs of Dover.

Then simply click the desktop shortcut or find the IL-2 Sturmovik: Cliffs of Dover program group in your Start menu and launch the game from there.

When launching the game for the first time, we highly recommend going into the Options screen first and adjusting Video, Audio, Realism, and Controls options prior to getting into a cockpit.

Please see the individual Options sections for more details.

To exit the game, return to the Main Menu and select Exit, or press Alt-F4 from anywhere in the game.

OPTIONS - REALISM

The Realism options in Cliffs of Dover are very extensive and provide an unmatched variety of gameplay possibilities. Set all the options according to your preference.

NOTE: Online servers set their individual Realism options according to host's preference. Server settings override your individual settings for the duration of the online session. Please refer to the Multiplayer section of this manual for more details.

You may notice that some options are listed normally (e.g. Cockpit Always On), while others are listed in the negative (e.g. No Outside Views). The reason for that is very simple. A selected option means more realism, and deselected means less. This way the options are easy to check at a glance. The more of them you select, the more realistic the simulation.

The options on the Realism screen are divided into various sections. Here they are in detail:

MAIN

This set of options defines your overall game experience.

Vulnerability. This is not an overall invulnerability option. Even with Vulnerability set to Off, there are still ways for your aircraft to be destroyed. The option does make your aircraft invulnerable to effects of gunfire and other ordnance. You will also survive collisions with other aircraft. However you can still take damage from collisions with the ground.

Realistic Ground Collisions. This option complements the Vulnerability option and determines how collisions with the ground or the sea affect the player's plane

Anthropomorphic Control. This option limits the amount of things you can do at one time to realistic proportions, usually to no more than two things at once. As a pilot has only two hands, and as most Battle of Britain era planes did not have HOTAS-style controls with important buttons always a flick away, moving the throttle and stick will usually mean having no hands to move a flap lever or vice versa.

Another important constraint enabled by this option is what was in previous titles called a **Separate Engine Start** option. This option is independent of the Complex Engine Management settings. Pilots in real multi-engine aircraft had to start up each engine separately. With **Anthropomorphic Control** option disabled you will be able to start up all aircraft engines with a single key. Otherwise you will need to individually select and start up each engine in turn.

Realistic Gunnery. With this options disabled, your rounds will be affected by ballistics a bit less. They will also be much larger in size, ensuring they hit their targets easier. Finally they will also deal triple damage. In summary, with Realistic Gunnery disabled you will find it much easier both to hit and destroy your targets.

Otherwise, using Realistic Gunnery and historical ammunition, be prepared to spend historical amounts of ammunition to bring down your targets. In some cases during the real battle a few German bombers managed to limp home with over a thousand bullet holes from regular (non-incendiary) ammunition.

Realistic Bombing. The main reason this option exists is our modelling of bomb detonators. Cliffs of Dover features detailed simulation of historical bomb detonators that, frankly, even some seasoned real-world pilots find a bit too complicated.

With this option disabled, your bombs will go off regardless of detonator settings.

Limited Ammo. This option limits your ammunition levels to historical levels. With the option disabled you will be continuously rearmed when in mid-air. Your ammunition stores will still deplete, but when they hit 0, they will be replenished again. This rearming process can take a few seconds for more complex weapons such as the 20mm cannon on the Bf-109E.

This option also affects all other armaments, such as bombs, torpedoes, gunner ammunition, etc.

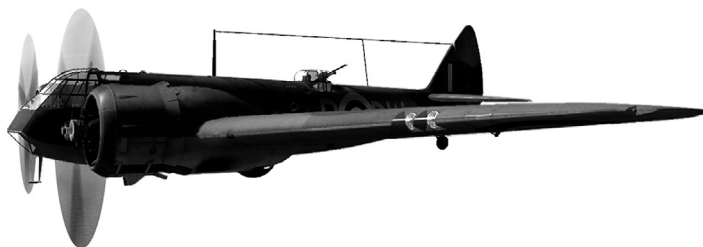
NOTE: Unlimited ammunition may confuse computer-controlled pilots. If you hand over controls to AI control with Limited Ammo disabled, they'll think it's Christmas. Especially if they're carrying bombs.

Limited Fuel. With this option enabled, the fuel in your aircraft will get used up as you fly around. With the option disabled, your tanks will never run dry.

No AI Control. Autopilot in Cliffs of Dover is much more powerful than real-world autopilots used even today, much less in WWII. Our in-game AI (Artificial Intelligence) will completely take over the aircraft, fly it along the mission path, engage targets along the way, and return you back home. It can even help you recover from a spin!

Disable AI Control for a more realistic and much more involved gameplay experience.

Mission Take-off and Landing. This is a legacy option left for 3rd party mission creators that conforms to standards set in previous IL-2 titles. It has no effect on stock missions and campaigns that ship with Cliffs of Dover.



VIEWS

This set of options defines the behaviour of the in-game camera.

Cockpit Always On. A pilot sits inside a cockpit which usually obscures a large portion of the world around him. This is most often a problem during a dogfight, when your target will slide behind the framework or underneath the aircraft nose and so on. With this option disabled, you will be able to toggle cockpit visibility with a keypress, switching between transparent gauge overlays or no overlays at all.

No Outside Views. A real pilot inside a real aircraft does not have the luxury of jumping out in mid-air and checking out his own plane, or zipping around to take a closer look at other planes around him. You, as a virtual pilot, can decide for yourself whether you'd like those limitations to apply to you.

Head Shake. When a real plane shakes, all its contents are shaken about too. When this option is enabled you will find your virtual head glide about your virtual cockpit quite a bit during manoeuvres or turbulence. Disable it for a rock-steady head position inside the cockpits.

Blackouts and Redouts. Blackouts occur when a pilot experiences high G-forces, leading to loss of vision and then consciousness. Red-outs result from negative G-forces, causing additional blood flow to the head and other unpleasant effects.

With this option disabled, you will never experience these unpleasant effects when flying aircraft inside Cliffs of Dover.

No Padlock. Padlock is a game mode which locks your in-game view onto a target you select, removing the need to use view keys or the mouse to look about. Some simulation fans feel it's an unrealistic handicap, while others believe it is an acceptable simulation of reality as keeping real eyes trained on a real target takes no button pushes.

If you fall into the former category, you can disable Padlock with this option. It is mostly intended for use on online servers.

ENGINES

This set of options defines the behaviour of in-game aircraft engines on the player aircraft.

Complex Engine Management. This is one of the most far-reaching realism settings in the game. In real WWII aircraft pilots had a huge variety of levers to operate depending on the aircraft they flew. The advance that began in 1940, right as the Battle of Britain was raging, introduced automated systems to aircraft engines that drastically reduced pilot workload. Still, even by the end of the war in 1945, many pilots still had to work multiple switches and levers constantly just to keep their engines running.

You as a player can choose to replicate their workload for yourself, or turn off Complex Engine Management and use nothing but the Throttle lever or buttons to operate your engine and automatically set optimal propeller pitch, mixture, radiator settings, and more.

Complex Engine Management is a very serious option. Even experienced flight sim fans and Il-2 Sturmovik online aces should be prepared for a steep learning curve. With this option enabled all aircraft will truly show their individuality, and you will need to specialise much more. Learning to manage the engine on a Spitfire will not at all mean that you'll be able to use this option in a BF-108, BF-109, BF-110.

Engine Temperature Effects. When engines run at high power, they overheat. Keeping the engine overheated for a period of time will often mean that it stops working altogether. As engines do tend to run at full power in combat, engines always seem to overheat at the worst possible moment in a dogfight.

Disable Engine Temperature Effects if you never want your engine to overheat.

NOTE: We highly recommend disabling Engine Temperature Effects during the early stages of learning Complex Engine Management. The combination of both is punishingly difficult. Some of the aircraft are absolutely unforgiving with both options enabled. For example you risk having your engine seize for good within seconds of improperly setting propeller pitch or mixture on many British fighters.

ATMOSPHERE AND HANDLING

This set of options defines the effects of the in-game atmosphere on a player's plane.

Wind and Turbulence. Disable this option to make sure the air around your aircraft is always perfectly calm. Otherwise, depending on the mission you fly, you may encounter heavy turbulence, cross-winds, and other nasty weather effects.

Flutter Effects. Flutter is an effect that is just as nasty as it is complex. Depending on conditions, a rash move of the control surfaces can cause your airframe to start shaking uncontrollably and potentially even lead to airframe destruction.

Torque and Gyro Effects. Rotating propeller works as a gyroscope, transferring motion to the body of the aircraft. This is especially noticeable during rapid throttle input.

Disable this option to make sure this does not happen. This is especially noticeable during take offs, as with this option disabled you will find that your aircraft will dip its wing upon leaving the ground

Stalls and Spins. A hard jerk on a stick can cause loss of lift in one or both wings, leading to loss of control. Every pilot's nightmare. Even the most experienced aces stall and spin out every once in a while. Newer pilots just learning to fly are much better off with these turned off.

Clouds. Clouds are of course a very important part of aerial combat. Not only do they provide beautiful background for it, they can serve as actors in a dogfight by hiding one opponent from the other.

However, clouds take up some system resources, and some players prefer to turn them off for increased performance. This option is added to the Realism options in addition to the Video options so that online servers can override individual user settings, as otherwise allowing some users to unilaterally turn off clouds while others do not would give them an unfair advantage.

AIRCRAFT SWITCHING

Cliffs of Dover contains a feature we believe has never before been seen in a major flight simulation. Depending on preference, you can jump into any other plane in the game at any time. Been shot down? Instead of restarting you can jump into a wingman's plane and continue with the mission. Can't get a bead on that pesky enemy ace? Jump into the enemy plane and drive him into the ground.

These options work both offline and online. You cannot of course take over from another human player, but many online missions contain computer-controlled planes. So when you join a server with these options enabled you can have the option of joining a mission already in progress instead of starting on the ground away from the action.

Cannot Switch Planes. This is the overall switch that enables or disables plane switching.

Cannot Switch Sides. This switch determines whether you can jump between opposition factions, or only switch between planes on your own side.

Cannot Select Sides. Server-side option for online play that determines whether players joining the server can freely select their faction, or whether they are assigned to factions by the host.

Cannot Select Planes. Server-side option for online play that determines whether players joining the server can freely select a plane to fly, or whether they are assigned to a plane by the host.

Cannot Create Groups. Server-side option for online play that determines whether individual players can create their own plane groups in the game.

VISUAL AIDS

This set of options determines the behaviour of many helpful interface elements that appear in the game during flight.

No Object Icons. Object icons point out aircraft and other important objects in the game world. They appear when the objects are sufficiently close. When the object is in direct view they appear as little lines of text next to the object. When the object is outside the view they appear as arrows at the edges of the screen that point towards the object, with the arrow size and shade changing depending on distance. These can be very helpful for newer players but are of course totally unrealistic.

No Map Icons. Icons for important objects can also appear on the in-game map that allow the player to navigate towards his targets even when they out of visual range.

No Map Path. The player's designated flight path is shown on the in-game map. Disabling this option is most useful when Map Icons are also turned off and can allow more hardcore players to practice their navigation skills.

OPTIONS - VIDEO

Historically, flight simulations have always been the most complex, the most advanced, the most resource-intensive computer programs available. Cliffs of Dover is a hugely complex simulation that usually has much more going on at any given time than games of other genres. First-person shooters or strategy games or even open world action games don't need to display a giant game world spanning dozens of miles in every direction, with every inch of it equally detailed and accessible to the player, while also processing complex physics and multi-layered artificial intelligence.

That is why Cliffs of Dover requires the most powerful computers available as of early 2011 to run at full graphical setting. A large variety of graphical options exist that allow the game to run well even on less powerful machines.

Resolution. A selection of native resolutions available on your machine. Reducing the resolution will have a drastic effect on performance.

Anti-Aliasing. Anti-Aliasing reduces the appearance of jagged edges on in-game objects at the expense of slightly reduced performance. Anti-aliasing in Cliffs of Dover uses an advanced algorithm that costs virtually nothing in terms of performance, and so we recommend enabling it even on lower-end machines.

Full Screen. The game can be run in a window. We however recommend running it in full-screen mode.

Detail Level. Overall setting for a multitude of other options. Select from a number of pre-selected options, or fine-tune individual settings in the Advanced section (see below).

Show Advanced. This check box displays a set of advanced options for more direct control of performance and visual quality.

Model Detail. Uniform setting applied to all moving objects in the world, including aircraft, cockpits, ships, bombs, trucks, tanks, flak guns, etc. This setting will have a strong effect on performance, while having perhaps the most drastic effect on the visual quality of the game. Turning Model Detail all the way down will make Cliffs of Dover look like a flight sim out of the early 1990s!

We therefore do not recommend reducing Model Detail more than a notch or two for anything but the lowest-end machines.

Buildings Detail. An additional detail setting for all buildings in the game world. As most buildings are rendered at lower detail at distance anyway, this setting will only have a noticeable effect when looking at a large number of buildings up close, such as when flying over the streets of London at low level.

Land Detail. In-game terrain has a lot of complex features. Reducing this setting will improve performance at the expense of making shorelines more jagged and the landscape more flat.

Forest. Forests in Cliffs of Dover consist of highly-detailed individual trees. A typical scene over land can therefore have tens of thousands of trees being drawn at the same time. Such numbers therefore require a lot of processing power. Turning off trees completely will greatly speed up the game, while of course making the landscape look extremely barren.

Visual Effects. This option determines the appearance of all in-game visual effects, such as flames, smoke, explosions, and so on. Reducing effect quality can improve performance during large battles when a lot of things are blowing up at once.

Clouds. Clouds are large complex somewhat transparent objects that scatter light in very subtle ways. Turning them off completely may greatly improve performance on lower-end machines.

Use HDR. High Dynamic Range attempts to improve upon the limited contrast available on most monitors. As Cliffs of Dover was built for HDR graphics, turning HDR off will greatly alter the in-game picture while improving performance. We recommend leaving HDR on anything but the lowest-end machines. If you turn this off, prepare for some really weird sights!

Damage Decals. This setting does not affect tactical markings on aircraft, as would appear at the first glance. Instead it affects the number and quality of damage decals applied to aircraft. At full setting a new hit decal will be applied to every location on every aircraft ever hit by gunfire which will affect performance in a large-scale prolonged battle. Reducing this setting will reduce the number of decals, making it more difficult to survey damage as some hits will not leave a mark.

Buildings Amount. Depending on where you are over the landscape, you may be looking at a very large number of buildings. Larger cities can show thousands of buildings on screen at a time, and flying over central London can fill your machine's memory with information on tens of thousands of buildings.

Reducing Buildings Amount will reduce the number of buildings shown to the player by not drawing them at shorter distances, and even randomly weeding out some buildings from the landscape. This can have a very strong effect on performance, but an unpredictable effect not only on the visuals but on the core mechanics of the game, as lower building amount settings can remove even mission-critical buildings from the game such as hangars for the player aircraft or famous landmarks.

Land Shading. A complex lighting model is applied to the game landscape, changing its appearance based on time of day, weather, and other conditions. Reducing this setting will speed up performance while making the landscape look less alive.

Grass. Different types of vegetation are rendered on the game's landscape which can slow down performance. Turning grass off will speed up the game, and only be noticeable at very low altitudes.

Shadows. Objects in the game world cast complex shadows onto themselves and the world around them. Calculating these shadows takes up some power, so turning off shadows will increase performance while making the entire world look flat.

Roads. There are lots of roads in Cliffs of Dover that are projected onto the landscape. Roads are rather complex objects that take up some processing power. Turning off roads will improve performance while causing all vehicles to drive around empty fields.



OPTIONS - SOUND

Sound options in Cliffs of Dover are refreshingly simple.

Volume allows you to set the overall sound volume.

Voice allows you to turn all in-game voices on or off.

Sound allows you to toggle all the game sounds on or off.

Finally, the **Speakers** section can either **Auto-Detect** the sound set up on your machine, or allow you to select your speaker configuration manually. The **Test** button plays sound to the selected speaker configuration allowing you to check your settings.

OPTIONS - CONTROLS

The Controls section is split up into two main sections, **Keys** and **Axes**, selectable as two tabs in the upper left corner of the screen.

The available control commands are further split into categories selectable at the top of the screen.

Cliffs of Dover contains a huge number of available commands that is much greater than the number of available keyboard keys and their combinations, so by default most of the commands come unmapped. It's a futile task to try to set them all up beforehand, so we recommend filling them up as you go along. People who prefer to fly different aircraft and to perform different tasks will grow to use different key commands in their own unique key setup.

You can have multiple assignments for each event, for example assigning the machine gun trigger both to the space bar on your keyboard and the trigger button on your joystick. The game supports virtually unlimited keys assigned to each event.

The three buttons at the lower left section of the command list, **New**, **Change** and **Delete** are used to manage these multiple key commands for one event.

To change the assigned key command, simply double-click on the line, or select it and hit the **Change** button.

To assign a new key command to an existing one even while keeping the previous assignments, select the existing assignment line in the list and then hit **New**.

To delete an existing key command, select the assignment line in the list and hit the **Delete** button. Of course, you cannot completely delete an entire event from the list. Trying to **Delete** the last remaining command assignment for the event will simply clear it.

Detailed information on specific keys can be found below in Playing the Game and Flying the Planes sections. Here's a brief overview of the various sections and the most important key commands.

VIEW CONTROLS

This set of options controls the location of the in-game camera. The most important controls include:

Toggle Cockpit. Pressing the Toggle Cockpit button cycles between all the available views.

NOTE: This command is controlled by the Cockpit Always On realism option. If the option is disabled, you can hide the cockpit model when looking from inside the aircraft and choose between the Gauge Overlay cockpit view, or seeing nothing but the crosshairs.

Internal View. This command puts you into the cockpit of your current aircraft.

External View. This command sets the camera outside the player's aircraft.

NOTE: This command is controlled by the No Outside Views realism option. If the option is disabled, you cannot use any External View commands

External Flyby. This command sets the camera somewhere ahead of the currently selected object's path, and tracks it as it flies by. This works for players and other aircraft in the game, as well as for vehicles, ships, and so on.

External Padlock. This set of commands sets the camera outside the currently selected object, which can be an aircraft or any other vehicle, focuses the camera on a nearby object of a selected type, and continues to track it.

Pressing the External Padlock button again cycles between all the nearby objects of the selected type in order of distance from the current object, from nearest to farthest.

The different types of object that can be tracked by the External Padlock commands are:

Enemy Aircraft. Any aircraft of the opposing side to the currently selected object. That is, if you play for the British and set the camera to your own plane, then Enemy Aircraft Padlock will track nearby German planes; however if you have your camera set on a German plane, then Enemy Aircraft Padlock will track British planes.

Friendly Aircraft. Any aircraft of the same side as the currently selected object.

Enemy Vehicle. Any vehicle of the opposing side to the currently selected object.

Friendly Vehicle. Any vehicle of the same side as the currently selected object.

HINT: Quickly pressing External Padlock when in the cockpit of your plane is a great way to check the airspace around you.

NOTE: This command is controlled by the No Outside Views realism option. If the option is disabled, you cannot use any External View commands

External View - Cycle. This set of commands moves the camera between all objects of a selected type in mission order, for example switching between planes of a squadron from squadron leader down through all subsequent wingmen regardless of their position in the game world.

The External View – Cycle commands can track Friendly or Enemy objects. Some External View – Cycle commands do not differentiate between sides and track all objects of the appropriate type regardless of their nationality.

The different types of object that can be tracked by the External View commands are:

Targets. All objects of the selected faction, sorted by type, planes first, then ships and vehicles.

Vehicles. All ground vehicles of the selected faction.

Aircraft. All aircraft of the selected faction.

Ships. All ships of the selected faction.

Wrecks. All locations of destroyed objects, regardless of faction.

Armament. Bombs and rockets currently detached from aircraft. The view will not set on bombs or armament still attached to aircraft, nor will it track cannon shells or machine gun rounds.

NOTE: This command is controlled by the No Outside Views realism option. If the option is enabled, you cannot use any External View commands.

Padlock View. Padlock is a game mode which locks your in-game view onto a target you select, removing the need to use view keys or the mouse to look about.

The Padlock feature only locks onto targets within visual distance of the player, and will not lock onto unseen objects that are either far away or obscured by terrain, clouds, or a player's own aircraft when not using the No Cockpit view.

Pressing the **Padlock View** key turns the padlock feature On and Off, cycling the view between nearby enemy aircraft.

The **Padlock View – Vehicle** is used to turn the padlock feature On and Off, tracking nearby enemy ground objects.

The **Padlock Next** and **Padlock Previous** commands are used to cycle between visible enemy targets in two directions.

NOTE: This command is controlled by the No Padlock realism option. If the option is enabled, you cannot use the Padlock feature.

Padlock View –Forward. A very useful command when using the padlock feature, this allows you to centre your view while holding the key and then return back to the padlocked target as soon as the key is pressed.

NOTE: This command is controlled by the No Padlock realism option. If the option is enabled, you cannot use the Padlock feature.

Glance at Dashboard. This command simulates the pilot bending forward and looking down at the instrument panel. Repeated commands cycle between the Dashboard and normal camera positions.

Loosen Shoulder Straps. This command simulates the pilot loosening his harness and leaning towards gunsight. Repeated commands cycle between the Gunsight and normal camera positions.

NOTE: This is the key that must be used on all German planes with offset gunsight to look directly through the crosshairs. It is also extremely useful for aiming with all other aircraft.

Raise Seat. This feature only works on aircraft with adjustable seat positions. It allows you to raise or lower your seat, moving your default camera position higher or lower.

Next / Previous Manned Position. These commands cycle between all available crew positions in multi-seat aircraft. You will not be able to enter positions manned by other players, or positions of dead crew members.

Manned Position #. This set of commands can be used to go directly to a specific crew position in an aircraft, and is very useful in aircraft with a larger crew. Manned Position #1 is always the pilot, and other numbers depend on the individual aircraft, with usual sort priority being pilot – co-pilot – bombardier – all others from nose to tail.

CAMERA SETTINGS

This set of options gives you additional control over the in-game camera and related elements. The most important controls include:

Toggle Independent Mode. This command cycles between the two main camera modes in Cliffs of Dover, Independent and Legacy.

In the **Independent** mode, the mouse cursor is independent of the camera position. The cursor can then be used to interact with clickable cockpit elements or the right-click menu. Rotating or moving the camera requires for an additional button to be held down.

In the **Legacy** mode, which was the standard camera mode in the older IL-2 titles, the mouse cursor disappears. Moving the mouse about rotates the camera. This makes it easier to look around but at the same time renders clickable cockpits unusable and denies access to the right-click menu.

If you rarely use clickable cockpits or the right-click menu, we recommend using the Legacy mode as your primary mode.

Camera Control in Independent Mode. Holding down this button while moving the mouse allows you to rotate the in-game camera around its current position.

Note that when rotating the camera inside the cockpit, your movement options are limited so as to simulate a real head moving on top of real shoulders, i.e. 360-degree Exorcist head rotation is not possible.

This button is also used in conjunction with other buttons to zoom or offset the in-game camera; see below.

Hold to Offset Camera. Holding down this button and moving the mouse slides the camera up, down, left or right while maintaining view direction. This can be done both outside and inside an aircraft, with the range of movement available inside the cockpit limited by realistic considerations.

In the **Legacy** cursor mode, this button alone is used to offset the camera.

In the **Independent** cursor mode, this button must be held down together with the **Camera Control in Independent Mode** button.

Hold to Zoom Camera. Holding down this button and moving the mouse zooms the camera in or out onto the current scene while maintaining view direction and field of view.

In the **Legacy** cursor mode, this button alone is used to zoom the camera.

In the **Independent** cursor mode, this button must be held down together with the **Camera Control in Independent Mode** button.

Hold to Adjust Field of View. Holding down this button and moving the mouse modifies the in-game camera's field of view while maintaining the overall camera position.

In the **Legacy** cursor mode, this button alone is used to change the field of view.

In the **Independent** cursor mode, this button must be held down together with the **Camera Control in Independent Mode** button.

Field of View x. There are three standard Field of View presets in Cliffs of Dover: 30°, 70° and 90°. They are used as the Close-Up lens (30°), the Normal lens (70°) and the Wide-angle lens (90°). Additional FoV settings are available with the **Hold to Adjust Field of View** command.

NOTE: The Close-up or 30° Field of View matches the picture seen by the naked eye the best. We highly recommend using the 30° lens for most screenshots or videos.

However this view is not particularly useful in a cockpit as it greatly limits the viewable area (which however is perfectly in line with what you would see with a naked eye without having to shift your gaze). The Normal 70° view shows a larger more useful area but slightly distorts the picture, and the 90° lens shows an even larger and an even more distorted area of the world. Please be aware of the distorted dimensions in the Normal and Wide field of views which will render objects at different distances from the camera with seemingly wrong proportions.

Reset View. This command resets the camera to its standard position, removing player-set zoom, FoV, offset or rotation.

Interact with Interface Overlay. A highly useful key is used to gain control of various interface elements such as transparent gauges or the various Info / Chat windows. In order to enable clickable cockpits, these overlays do not normally capture mouse clicks. Use this command to switch focus to the overlay element under the cursor and move, resize or otherwise modify it to your liking.



PAN VIEW

There are two ways to control the in-game views with keys, in addition to controlling the views with the mouse. Intended to be used with the joystick view hat or the numpad keys on the keyboard, the view keys rotate the camera up, down, left or right.

There's the Snap way of rotating the camera, where the view stays rotated to the desired position for as long as the key is held, and then returns to centre once the key is depressed.

Then there is the Pan way of controlling the views, which leaves the camera rotated to its newly changed position, so more key presses are needed to re-centre the camera.

Some prefer to Pan their view, others prefer to Snap, and some experienced online aces even like to switch between Pan and Snap modes depending on situation.

The most important controls include:

Pan xxx. The multitude of options for panning left, right, up, down and everywhere in between allow you to control the view position.

Return to Front View. This quick command quickly re-centres the view.

SNAP VIEW

This set of options is the flip side of the Pan View settings. The most important controls include:

Snap xxx. This multitude of options rotates the camera to the specified angle from the centre, with the options of 45, 90, and 135 degrees left, right, up, and down.

Snap Forward. This quick command quickly re-centres the view.

IN-GAME TIME

This set of options controls the flow of in-game time. The available time compression options are 0.25x (time flows four times as slow), 0.5x (twice slower), 1x (normal), 2x (twice faster), 4x and 8x.

The two key commands for increasing or decreasing the game time move between all these options in both directions.

These options are only available offline.

NOTE: Control input is still controlled normally during accelerated time. We do not recommend manually flying the plane at 4x or 8x time, as even a small control input will effectively be multiplied by 4 or 8 while giving you a greatly decreased time to react. A gentle push on the stick can send you crashing into the ground in just a few real-time seconds.

The most important controls include:

Accelerate. Increases the flow of in-game time.

Decelerate. Decreases the flow of in-game time.

Reset to Normal. Resets the game time to 1x.

GENERIC

This set of general options is used throughout the game. The most important controls include:

Toggle AI Control. Cliffs of Dover ships with an autopilot that is much more powerful than real-world autopilots used even today, much less in WWII. Our in-game AI (Artificial Intelligence) will completely take over the player's aircraft, fly it along the mission path, engage targets along the way, and return you back home. It can even help you recover from a spin!

In short, enabling AI Control of your aircraft will turn it into a computer-controlled plane no different from all the other planes flown by the computer in the mission. Depending on skill levels set to the player's plane in the mission, the computer can either fly as a seasoned ace or a helpless rookie.

NOTE: It is theoretically possible to pass every campaign mission and reach most mission objectives offline by simply enabling AI Control at the beginning of each sortie and letting the computer do your work for you. However we do recommend taking over at least for the combat parts, because as a player you will often reach more impressive results than the limited self-preserving AI.

Fire Current Weapon. This command does not work for pilot cockpits, but instead fires the weapon controlled by a gunner or another crew member when the player takes over their position.

Use Canopy / Hatch / Door. A blanket command that operates a wide variety of openable hatches, doors and other window-type apparatuses available to various crewmembers. Their type and function greatly varies by plane and position. On some planes it will open the canopy, on others crack open a side window, or open the escape hatch for a remote crewmember.

NOTE: All these windows and hatches are affected by physics. Depending on window size and type, opening and closing it may take a very long or a very short time. For example, trying to push the glass-house canopy of an airborne Bf.109 into a 300 mph airstream takes a lot of strength, and therefore will take a long time; while closing it will instantly snap it shut.

Toggle. Repeated presses of this key will move the window between the Open and Closed position, and any intermediate positions if available. This option is intended for most control layouts.

Close. This key will set the available window to Closed regardless of its current state. This option is mostly intended for more complex or more realistic control layouts.

Open. This key will set the available window to Open regardless of its current state. This option is mostly intended for more complex or more realistic control layouts.

Primary Cockpit Illumination. These commands operate the primary illumination system for the current cockpit. Depending on particular position, this may mean turning on a lamp somewhere, or switching on illuminated gauges. Some positions on some aircraft do not have illumination altogether, while others have both Primary and Secondary illumination that operate different light controls. Of course these options are intended for use at night.

Toggle. Repeated presses of this key will switch the illumination between the On and Off positions.

Increase. This key will either set the illumination to On, or turn up the illumination to intermediate positions if available.

Decrease. This key will either set the illumination to Off, or turn down the illumination to intermediate positions if available.

Gunsight Illumination. Most gunsights used during the Battle of Britain were reflector sights with the sight lamp inside the sight housing. In order to increase the bulb's lifespan the gunsights were not constantly turned on, but rather switched on during combat and switched off later. Most sights also had adjustable brightness levels intended for different light conditions.

Toggle. Repeated presses of this key will switch the illumination On or Off.

Increase. Increase gunsight brightness levels. Use to make crosshairs more visible during the day.

Decrease. Decrease gunsight brightness levels. Use to reduce glare during the night.

NOTE: We do not model light bulbs going dead due to prolonged use as, while realistic, we feel it would be unnecessarily sadistic. Do not be afraid to keep your gunsight on at all times if you prefer.

AIRCRAFT

This set of options is used to pilot the aircraft and contains the most important game commands, including:

Aileron Control. All aircraft in Cliffs of Dover are fully controllable with a keyboard. These key commands are intended for use by players without joysticks.

The ailerons are the control surfaces on the wings of the aircraft that make it roll to the sides. Left aileron makes the aircraft dip its left wing, and the right aileron makes the right wing go down.

Full Left / Right. Fully deflects the aileron to the side. Used for quick rolls. The most common control binding for most keyboard pilots.

Notch Left / Right. Slowly deflects the aileron to the side while the key is held, and keeps it at the deflected position. Intended for more advanced keyboard fliers. Gives slower roll rates compared to Full Aileron keys, and is highly dependent on keyboard repeat rate.

Centre. Centres the ailerons. Intended to be used in conjunction with the Notch Aileron keys.

Elevator Control. The elevators are the horizontal control surfaces at the tail of the aircraft that control its pitch, or make its nose go up or down. Up elevator points the nose up, and down of course points it down.

Full Up / Down. Fully deflects the elevator up or down. Used for quick and easy control. The most common control binding for most keyboard pilots.

Notch Up / Down. Slowly deflects the elevator while the key is held, and keeps it at the deflected position. Intended for more advanced keyboard fliers. Gives slower control response compared to Full Elevator keys, and is highly dependent on keyboard repeat rate.

Centre. Centres the elevator. Intended to be used in conjunction with the Notch Elevator keys.

Rudder Control. The rudder is the vertical control surface at the tail of the aircraft that control its yaw, or make it turn left or right in the same pane as the steering wheel that turns a car. Left rudder swings the nose of the aircraft to the left, while the right rudder swings it to the right.

Full Left / Right. Fully deflects the rudder up or down. Used for quick and easy control. The most common control binding for most keyboard pilots.

Notch Up / Down. Slowly deflects the rudder while the key is held, and keeps it at the deflected position. Intended for more advanced keyboard fliers. Gives slower control response compared to Full Elevator keys, and is highly dependent on keyboard repeat rate.

Centre. Centres the rudder. Intended to be used in conjunction with the Notch Elevator keys.

Autorudder. A highly unrealistic feature that nevertheless is highly useful when flying with the keyboard. The feature attempts to use the rudder on the player's aircraft to keep it flying in a straight line, or to keep the nose on the horizon during turns. It will usually have a positive effect on stability during flight, but may have unintended effects during more complex manoeuvres by trying to keep your plane stable when you may not want it to be.

Off. Disables the Autorudder. The rudder can only be adjusted manually.

Low. A gentler automatic rudder input will not fight you quite as hard when manoeuvring.

High. A heavy robot foot on the rudder will try to keep you straight and level at all costs!



Throttle. With **Complex Engine Management** turned off the Throttle control directly controls engine RPM.

With **Complex Engine Management** enabled the Throttle controls the engine throttle, with the RPM further determined by mixture, prop pitch and other flight parameters such as altitude, airspeed and airflow.

The throttle commands have 11 positions available in 10% increments from 0% or closed to 100% or fully open. Throttle control can also be assigned to an axis that allows finer control at 1% increments. You can control the throttle for each engine separately on multi-engine aircraft.

Open / Closed / Intermediate. Specific commands are provided to explicitly set the throttle to a desired setting.

Decrease. Decrease the throttle by 10%.

Increase. Increase the throttle by 10%.

Throttle War Emergency Power. Many aircraft in Cliffs of Dover have the throttles that go beyond 100% allowing for a quick boost of power that rapidly uses up fuel and overheats the engine. The setting beyond 100%, designated as 110% in the game, is considered the WEP position.

The WEP command toggles it On and Off, that is sets the throttle to 110% or resets it back to the previous setting.

*NOTE: Using WEP for a long period of time may destroy the engine.
Use it sparingly.*

Fire. There are several commands for firing different types of ordnance carried by the warplanes in Cliffs of Dover.

Machine Guns. The trigger for the aircraft's machine guns, if so equipped.

Cannon. The trigger for the aircraft's cannon, if so equipped.

Machine Guns + Cannon. While most historical aircraft equipped with both machine guns and cannon had separate triggers for each, Cliffs of Dover also have an unrealistic trigger command that fires all / any onboard guns simultaneously.

Rockets. Fires rockets, if so equipped.

Drop Bombs. Drops bombs, if so equipped. If the bombs carried are housed in the bomb bay, the bomb bay doors must first be opened.

NOTE: The machine gun / cannon commands will only fire the guns controlled by the pilot and not the guns carried by any gunners. Those are controlled by the Fire Current Weapon command in the Generic section.

However, the Rockets and Bombs commands will fire that ordnance from the pilot's position even when that ordnance is controlled by the bombardier or other crew members. In these cases, the button simulates the pilot ordering the bombardier to drop bombs.

Aileron Trim. Most aircraft contain additional control surfaces on top of the main control surfaces that finetune their centred position. The airframe is affected differently by the airstream depending mainly on airspeed and altitude, and also other factors. For example, centred elevator at 100 mph can cause the aircraft to tend to pitch up, but at 400 mph can cause it to pitch significantly down. This is where trim comes in. So as not to require the pilot to constantly apply force to the controls, the trim surfaces can be used to finetune the centred position input to allow for hands-free flight at a given condition.

As airspeed and altitude changes, trim settings need to be adjusted. Most common times to adjust trim are for take-off, for cruise at specific speed / altitude, and for landing.

The availability of trim varies by aircraft. Few aircraft in the Battle of Britain had controls for aileron, rudder and elevator trim. Some had just one or two trim controls, some only had trim tabs that could be adjusted on the ground, and some even had no trim controls at all.

When attempting to use trim on aircraft not so equipped, the control commands will have no effect.

Left / Right. Adjusts aileron trim one notch to the left or right.

Reset. Resets the trim to the neutral position.

Elevator. Controls the trim of the elevator. Not all aircraft are equipped with elevator trim.

Nose-Up / Nose-Down. Adjusts elevator trim one notch up or down.

Reset. Resets the trim to the neutral position.

Rudder Trim. Controls the trim of the rudder. Not all aircraft are equipped with rudder trim.

Left / Right. Adjusts rudder trim one notch to the left or right.

Reset. Resets the trim to the neutral position.

Landing Flaps. Landing flaps are generally used to improve lift at low speeds, especially during take off and landing. Operating flaps at higher airspeeds may damage or destroy the flaps.

Some aircraft have flaps that can be used in combat as well. Some flap mechanisms are too slow for fine control, but many fighters have quick flaps, sometimes even with intermediate Combat positions; this can be a real life saver in a low-speed turning knife fight by saving a plane from a stall or tightening a turn.

Toggle. Cycles the flaps between all available positions. Some aircraft only have the Up and Down positions, while others may have intermediate flap settings as well.

Lower. Sets the flap to the next available lower position.

Raise. Sets the flap to the next available higher position.

Undercarriage. The landing gear on aircraft is of course used to carry the plane while on the ground. A large non-aerodynamic object, the landing gear is usually retracted into the main aircraft body when in flight. Aircraft modelled in Cliffs of Dover use different types of landing gear, and some even have fixed landing gear that cannot be retracted.

More advanced WWII aircraft had automatic one-button landing gear operation, while others had a more primitive manual lever or a wheel that had to be cranked for many turns to operate the undercarriage.

Toggle. Cycles automatic landing gear between the Up and Down positions.

Lower. Automatically lowers the landing gear.

Raise. Automatically raises the landing gear.

Manually Lower. Manually cranks the landing gear to the Down position. Requires multiple key presses.

Manually Raise. Manually cranks the landing gear to the Up position. Requires multiple key presses.

Airbrake. Some aircraft, especially dive bombers, are equipped with a special air brake that slows them down in a dive.

Toggle. Cycles the airbrake between the Up and Down positions.

Lower. Lowers the airbrake.

Raise. Raises the airbrake.

Bomb Bay Doors. Many bombers carry their bombs in an internal bomb bay. In order for the bombs to be dropped, the bomb bay needs to be opened. After the bombs are dropped, the bomb bay needs to be closed.

Toggle. Cycles the bomb bay doors between the Open and Closed positions.

Open. Opens the bomb bay doors.

Close. Closes the bomb bay doors.

Toggle Bombs Armed. Bombs carried to battle are usually not armed right at the start. This way the bomber is not an automatic death trap that can explode at the slightest provocation. Bombs are usually armed on approach to target when they are certain to be dropped. This command toggles the arming of the bombs. Bombs will not explode if dropped when disarmed, so be sure to arm your bombs every time!

Toggle Selected Engines. Starts / stops the engine or engines currently selected. You always start with all engines selected. With the **Complex Engine Management** realism option however, multiple engines cannot be started with one key. You will instead need to select each engine in turn and start it separately when flying a multi-engine aircraft with CEM turned on.

NOTE: As many aircraft required a ground crew member present to start an engine, you may not be able to restart a stopped engine in mid-air on many aircraft even with Complex Engine Management turned off.

NOTE: The command only toggles an engine on and off when Complex Engine Management is turned off. Use magnetos to turn an engine off with CEM enabled.

Magnetos. A magneto is an electrical generator that gives power to the spark plug in an aircraft engine. Varying magneto set-ups are used in different aircraft in Cliffs of Dover. Some have one magneto per engine, while most have two. With **Complex Engine Management** enabled, magnetos are the only way to turn off an engine.

A large number of magneto controls is provided, allowing manual control over every possible magneto on every possible engine. These are intended for people with complex multi-control set ups. The options include:

Next - Previous. These commands cycle between available engines and / or magnetos on each engine.

Toggle. Toggles the selected magneto On or Off.

On. Turns the selected magneto On.

Off. Turns the selected magneto Off.

Radiator. Most aircraft engines are equipped with radiators that help them cool. Opening the radiator disturbs the airflow and slows down the aircraft, so using the radiator to maintain the balance between engine temperature and airspeed is a fine art.

Most radiators have 11 positions available in 10% increments from 0% or closed to 100% or fully open; radiator control can also be assigned to an axis that allows finer control at 1% increments. You can control each radiator separately on multi-engine aircraft.

Toggle Automatic Control. Some advanced aircraft have automatic radiator control that makes managing engine temperature a breeze.

Open. Opens radiator to the next available position.

Close. Closes radiator to the next available position.

Mixture. Depending on altitude the amount of fuel added to the intake airflow needs to be adjusted. More fuel in the mixture makes it rich; less fuel makes it lean. Mixture needs to be richer at lower altitudes and leaner at higher altitudes.

Mixture comes with 11 available positions in 10% increments from 0% or closed to 100% or fully open; control can also be assigned to an axis that allows finer control at 1% increments.

You can control the mixture on each engine separately on multi-engine aircraft.

Lean / Intermediate / Rich. Specific commands are provided to explicitly set the mixture to a desired setting.

Decrease. Make the mixture 10% leaner.

Increase. Make the mixture 10% richer.

Propeller Pitch. More advanced aircraft in the Battle of Britain had propeller pitch controls that adjust the angle at which the propeller blades strike the air allowing the pilot to find the most optimal angle of attack for the airscrew depending on airspeed, similar to transmission in a car. Different prop pitch settings exist for different aircraft.

Some aircraft are even equipped with automatic prop pitch controls or with constant-speed propellers.

Propeller pitch comes with 11 available positions in 10% increments from 0% or closed to 100% or fully open; control can also be assigned to an axis that allows finer control at 1% increments.

You can control the prop pitch on each engine separately on multi-engine aircraft.

Toggle Automatic Control. Turn automatic propeller pitch on or off if so equipped.

Open. Increase propeller pitch by 10%.

Close. Decrease propeller pitch by 10%.

Engine Selection. Multi-engine aircraft can have various settings like throttle, mixture, prop pitch or radiator control adjusted individually. Differential throttle is highly useful, for example allowing for tighter turns by chopping the throttles on the inboard engines, countering yaw, or even enabling steering with control surfaces shot off or disabled.

One or more engines can therefore be selected or deselected at one time. Control inputs are only sent to the currently selected engines.

Select. Adds a specified engine to the current selected.

Deselect. Removes a specified engine from the current selected.

Toggle. Adds or removes the specified engine from the current selected.

TURRET

This set of options is used to control gunner turrets on aircraft. The most important controls include:

Cruise / Firing Position. Many aircraft with rear gunner positions stow the gunner weapon or the turret itself in a cruise position to improve airflow or to remove the need for the gunner to constantly man the position. The gunner position cannot be operated and the weapons cannot be fired in the cruise position.

Use the **Toggle / Cruise / Firing position** commands to switch between available positions for each gunner seat.

NOTE: Computer-controlled gunners will work their positions as needed. If you switch between positions and allow the computer to take over, they will override your settings as they see fit.

Move Mount. Most gunner turrets contain two main moveable parts. First is the turret or the gun mount that can be rotated or moved about. On top of the turret or the gun mount is the gunner's weapon itself that has its own range of movement.

Controls and capabilities for each of the two parts differ by aircraft, but the gunner always has separate controls for each of the two. They will usually move the gun itself with their hands, and turn the mount or turret with a hand switch or a foot pedal.

Operation of the gun mount control in the game uses realistic constraints. On some aircraft the mount control was rather complicated, and required the gunner to unlock the mount, slide it about, and then lock it again. We do not model these controls separately, but rather model the lock / unlock operation into the time required to operate the mount. Mounts also consider the effects of the airstream on their exposed parts. In short, moving the mount may sometimes be slower than you want it to be.

The four button controls for the mount allow you to move it **Up, Down, Left and Right**.

Move Gun. Complementing the Move Mount commands, the Move Gun controls allow you to move the gun on the mount Left, Right, Up and Down.

NOTE: The turret gun can also be moved with the mouse or assigned to controller axes, which is the recommended method.

RADIO COMMS

This set of options is used to issue commands to AI-controlled squadmates. The most important controls include:

Open / Close Orders Panel. Displays or hides the window containing the various orders that can be issued. The elements in the window will depend on the current mission and the player's position within flight.

Navigate / Select / Issue Order. These commands are used to select a recipient and to find, select and send the order out.

CHAT

This set of options is used for online chat and includes the following controls:

Cycle Recipients. Cycles between All, Friendly, Enemy, or Vicinity options, selecting the range of players who will receive the message.

Send Message. Sends out the message.

VEHICLE

This set of options is a taste of things to come. At this stage it is mainly intended for use by 3rd party content developers.

AXES - AIRCRAFT

This set of options is used to assign controller axes to various game functions. Cliffs of Dover recognises joysticks, gamepads, and most other controller types.

Furthermore, each axis assignment can be individually finetuned with various options.

The most important axes include:

Aileron. This controls the aircraft ailerons.

The axis has additional controls for Sensitivity and Dead Zones at 0 and 100%.

Elevator. This controls the aircraft elevator.

The axis has additional controls for Sensitivity and Dead Zones at 0 and 100%.

Rudder. This controls the aircraft rudder.

The axis has additional controls for Sensitivity and Dead Zones at 0 and 100%.

Throttle. This controls the throttle of the selected engine or engines.

The axis has additional controls for Sensitivity, 0% position, 100% position, Max Position, and Dead Zones at 0 and 100%.

Flaps. This controls the position of the aircraft's flaps.

The axis has additional controls for Dead Zones at 0 and 100%.

The fine-tuning controls are used to adjust how the control input is mapped to output. There is rarely a direct line between input and output, and depending on individual settings, a throttle lever physically moved to 67% of its range may translate to 60% or 75% or some other setting in the game.

The controls include:

Sensitivity. Sets the linearity of the control input, that is, defines whether the controller input is directly mapped to controller output in a straight line where input is equal to output, or whether the output is non-linear and smaller controller movements are mapped to a smaller output than direct, and larger are mapped to greater control output.

To put it simply, linear input provides for more responsive controls, and non-linear input is more precise and steady.

0 sensitivity is fully linear, and 100 is fully non-linear.

Dead Zone. A dead zone is an area of an axis that is considered as a single point, i.e. the physical range of 0% to 5% of an axis is considered to be the 0% control setting. Dead zones are needed around the edges of the control input so that it is easier to maintain control at max or min position. Set your dead zones according to preference and to the specifics of your individual controller. For example, if you see the controller output trembling between 99% and 100% where you want it to be max, increase the Dead Zone to 100% for the axis. Or if you find that the control output hits max when the actual controller in your hand is not fully deflected, decrease the Dead Zone to 100% for the axis.

Position. These additional controls are given only for the Throttle axis. The need to set 0, 100 and Max positions for the Throttle is due to the fact that many aircraft in the game have War Emergency Power available, which allows you to push the throttle past 100%. Therefore, the 100% physical position of the throttle lever is mapped to a 110% position of the in-game control. The additional fine-tuning allows you to set exactly where the 100% position is in relation to the Max%.

AXES - TURRET

This set of options allows you to control the gunner turrets with a joystick or other controller. The controls include:

Yaw. This moves the turret left and right.

Pitch. This moves the turret up and down.

AXIS - VEHICLE

As with the Vehicle key commands, this section is mainly intended for use by 3rd party developers.

OPTIONS - PLANE

The plane options screen is used to individualise the player's plane as well as to access various additional weapon and system settings.

Not all aircraft have access to all Plane options; however the unavailable options are not always greyed out. Attempts to set an option for a plane that can't accommodate it will simply be ignored.

The settings are saved for each aircraft individually.

The options include:

Type Selection. The drop-down list contains various options for filtering out the Plane Selection drop-down alongside it. This allows for easier selection of a proper plane, which will be especially helpful as we plan to greatly expand the available plane selection in subsequent releases.

Plane Selection. List of all planes of the type selected in the Type Selection drop-down to the left.

Army. The side for which the plane will fight. Usually limited to Blue (Axis) and Red (Allied) in offline games, or populated with additional armies for online games.

Country. A country member of the selected Army that the plane belongs to. This determines the plane's national markings.

Hierarchy. Type of regiment the plane flies for, for example Fighter, Dive Bomber, etc.

Regiment. The actual regiment the plane is the member of.

This determines the tactical markings type and regiment code on the plane.

Squadron. The sub-unit within the regiment the plane is a member of, i.e. a flight for the RAF or a Staffel for the Luftwaffe.

This determines additional details of the tactical markings on the plane.

Callsign. Selection of callsigns available for the selected Country.

Paintscheme. Selection of skins created by Maddox Games or 3rd party developers. This determines the overall paintscheme of the aircraft.

Noseart. Some aircraft have designated noseart areas on their Left or Right sides, or both. These controls allow you to select a noseart badge from the list.

Tail Number. Depending on aircraft, this can be a letter, a number, or a symbol assigned to keep track of the aircraft by the squadron and / or signifying the pilot's role in the group.

Please see the Tactical Markings section for more details.

Serial Number. Most aircraft also display the serial number which is usually assigned to it at the factory. Historically these were mostly used by headquarters to keep track of aircraft inventory.

Custom Colours. Some aircraft have additional paint scheme elements that can have their colours set by the user. The actual location and function of each varies by aircraft.

Markings. Hides or shows all tactical national markings on the aircraft. This is intended for use with custom paint schemes that have their own markings painted on.

Visual Weathering. The degree of visual weathering of the plane such as paint chips, dirt, grime, etc. 0% means a brand-new factory fresh plane, and 100% is a beat-up old hangar queen.

Setting visual weathering has no effect on the performance of the aircraft.

Physical Weathering. The flip side of the visual weathering setting, this slider allows you to set how well the aircraft's systems operate. 0% means the plane is in perfect working order, and 100% means it's an accident waiting to happen. The actual details of a higher Physical Weathering setting are determined randomly, including which systems are affected, how broken they are, and at what times they may completely break down.

While 100% physical weathering means on average a much higher chance of more things going wrong, the random nature of the failure model can mean that you'll fly an uneventful mission in a 100% plane, and have a wing fall off on start-up in a 1% plane.

NOTE: This setting is not for the faint of heart. Even the more hardcore players often find it infuriating, reset it to 0 and never touch it again. You can only take so many missions in which your engine seizes in the middle of a heated dogfight and you float down helplessly waiting to get shot out of the sky.

Kills. Some aircraft enable the display of kill markings somewhere on the aircraft, such as on the rudder of a German fighter. The number you input here will translate into a number in a designated markings area on the plane, within limits of course. You won't be able to give yourself thirteen thousand kills.

Loadout. This button opens additional Loadout options.

Please see the Loadout sections below for more details.

TACTICAL MARKINGS

Different countries modelled in Cliffs of Dover used wildly different tactical markings not just nationally, but often for different plane types. Cliffs of Dover attempts to faithfully recreate them all.

While the actual layout and type of markings is selected automatically based on your Country and Regiment selection, the Tail Number and the Serial Number can be individually set by the player.

NOTE: The information below is not an exhaustive reference of all possible historical options. It is not even meant to be a complete listing of all markings options available in the game. It is just a quick guide for making your aircraft look acceptably accurate with a commonly used tactical marking set-up.

Fans interested in recreating more minute details of historical markings are urged to check additional sources online or in print.

The options available include:

ITALY

The system used for most aircraft flying in the Battle of Britain was rather uniform regardless of plane type or squadron.

Tail Number. Usually a one- or two-digit number for any regiment type, preceded by a two- or three-character number designating the squadron. The squadron number is added onto the plane automatically.

Serial Number.

Fighters: usually a six-character string starting with MM and followed by four numbers.

Bombers: a seven-character string starting with MM and followed by five numbers.

Some Examples (symbols in **bold** can be set by the player, symbols in *italics* are automatically set by Cliffs of Dover)

Plane	Squadron	Tactical #	Serial #
CR.42	83a Squadriglia	83- 1 (?)	<i>MM5694</i>
CR.42	95a Squadriglia	95- 14	<i>MM5703</i>
G.50	20 Gruppo	20	<i>MM5372</i>
G.50	352a Squadriglia	352- 7	(none)
BR.20M	242a Squadriglia	242- 4	<i>MM22626</i>
BR.20M	243a Squadriglia	243- 9	<i>MM21879</i>

RAF

The system used for most British aircraft flying in the Battle of Britain was rather uniform regardless of plane type or squadron.

Tail Number. Usually a single-character letter from A to Z. Numbers entered into the Tail Number field will be translated into a corresponding letter, such as 2 into B, 11 into K, etc.

The only exception is the Tiger Moth when assigned to the London School of Flying regiment. In this case the aircraft code will consist of three letters.

Serial Number. Usually a five-character string starting with a letter and followed by four numbers.

Some Examples (symbols in **bold** can be set by the player, symbols in *italics* are automatically set by Cliffs of Dover)

Plane	Squadron	Tactical #	Serial #
Hurricane Mk I	No. 151 Squadron	<i>DZ-E</i>	L1754
Hurricane Mk I	No. 312 Squadron	<i>DU-J</i>	L1926
Spitfire Mk I	No. 74 Squadron	<i>ZP-J</i>	K9867
Spitfire Mk II	No. 41 Squadron	<i>EB-Z</i>	P7666
Blenheim Mk IV	No. 40 Squadron	<i>BL-V</i>	R3612
Short Sunderland	No. 201 Squadron	<i>ZM-Q</i>	T9087

LUFTWAFFE

The tactical markings system for the Luftwaffe in WWII must have been designed by a mad genius. Comparative simplicity of the systems used by Italy and the British is a further testament to the fact.

The system will seem extremely convoluted to most everyone who reads this guide; imagine programming all that into the sim!

Tail Number. Two completely different systems were used for bomber and fighter aircraft.

Fighters: Squadron designated by squadron badge. Tactical number either consists of a one- or two-digit number, or a special symbol such as double chevron for a group commander. See below for all symbols supported by Cliffs of Dover.

Colour of the tactical number determines the Staffel within the squadron the aircraft belongs to. Some Gruppen are also marked with another special symbol aft of the fuselage cross, such as a horizontal line for II. Gruppe or a curvy line for the III. Gruppe.

Bombers: a four character string, in which the first two symbols are the squadron code, usually a number and a letter. The next symbol is the individual aircraft letter, and the final is the letter that identifies which Gruppe and Staffel the aircraft belongs to. The final letter also determines the colour of the individual aircraft letter.

Serial Number or Werknummer: usually a four-digit number.

Some Examples (symbols in **bold** can be set by the player, symbols in *italics* are automatically set by Cliffs of Dover)

Plane	Squadron	Tactical #	Serial #
Bf-109E-3	II./JG26	<<+-	1542
Bf-109E-3	7./JG26	7+	1195
Bf-110	5./ZG1	<i>G9+IN</i>	4277
Bf-110	Stab II./ZG76	<i>M8+KC</i>	3863
He-111	Stab./KG55	<i>G1+FA</i>	1582
Ju-87	III./StG51	<i>6G+AD</i>	5338

LUFTWAFFE FIGHTER SYMBOLS

Note that there are multiple variants for some positions, which give similar but distinct markings. For example both <|- and <|I mean Geschwader Adjutant, but display different graphics on the aircraft. These variations were generally created and used by individual squadrons.

Symbol	Deciphered	Meaning
< -	[less than] [vert line] [dash]	Geschwader Adjutant
<	[less than] [vert line]	Geschwader Adjutant
< I	[less than] [capital I]	Geschwader Adjutant
--	[dash] [dash]	Geschwader Adjutant
-o	[dash] [lower case o]	Geschwader Adjutant
<--	[less than] [dash] [dash]	Geschwader Commodore
<_1	[less than] [underscore] [number 1]	Geschwader Commodore
<-	[less than] [dash]	Geschwader Commodore
<.-	[less than] [period] [dash]	Geschwader Commodore
<<-	[less than] [less than] [dash]	Geschwader Commodore
<<<4	[less than] [less than] [less than]	Geschwader Commodore
K<<	[less than] [less than]	Geschwader Commodore Kuban
<	[less than] [vert line] [vert line]	Geschwader Major Beim Stab
<o-	[less than] [lower case o] [dash]	Geschwader Technical Officer
<O-	[less than] [capital O] [dash]	Geschwader Technical Officer
< o	[less than] [vert line] [lower case o]	Geschwader Technical Officer

<Io	[less than] [capital I] [lower case o]	Geschwader Technical Officer
< O	[less than] [vert line] [capital O]	Geschwader Technical Officer
<IO	[less than] [capital I] [capital O]	Geschwader Technical Officer
<	[less than]	Gruppen Adjutant
_<	[underscore] [less than]	Gruppen Adjutant
<1	[less than] [one]	Gruppen Beim Stab
<.	[less than] [period]	Gruppen Kommandeur
_<.	[underscore] [less than] [period]	Gruppen Kommandeur
<<	[less than] [less than]	Gruppen Kommandeur
I<<	[capital I] [less than] [less than]	Gruppen Kommandeur
<o	[less than] [lower case o]	Gruppen Technical Officer
<O	[less than] [capital O]	Gruppen Technical Officer
T	[capital T]	Gruppen Technical Officer
<*	[less than] [asterisk]	Gruppen Technical Officer
<t	[less than] [lower case T]	Kommodore
<0	[less than] [zero]	Kuban
-A-	[dash] [capital A] [dash]	Stab.
I_	[capital I] [underscore]	Stab.

NOTE: Many of these symbols were historically meant for Stab aircraft only; however you can still assign them to other Staffeln, which may colour these symbols in non-historical Staffel colours.

Additional symbols

While these symbols can also be used in the Tail Number slot of a fighter, they were not generally used in that position.

-	[dash]	II. Gruppe Symbol
~	[tilde]	III. Gruppe Symbol
	[vertical line]	III. Gruppe Symbol
---	[dash] [dash] [dash]	III. Gruppe Symbol
+	[plus]	IV. Gruppe Symbol
*	[asterisk]	IV. Gruppe Symbol
B	[capital B]	Bomben Group
t	[lower case T]	Lehrgeschwader

LOADOUT – WEAPON SETS

The Weapon Sets section of the Loadout screen allows you to select an existing or create your own set of weapons to be carried on a particular aircraft. This is especially useful for bomber aircraft, where, depending on preference, you might create presets for dive bombing missions, high altitude level bombing, anti-ship configuration, etc, each with unique bomb configuration.

The general game mechanic is as follows. Each aircraft in Cliffs of Dover has its own weapon slots, or locations on it where weapons of a certain type can be carried. Each of the slots can house one or more weapon variants. Slots can be for forward-firing weapons, such as machine-guns or cannon; for additional weapons carried by gunners and other crewmen; for rockets; and for bombs.

The Weapons Sets section shows you all the weapon slots on the selected aircraft, and the available options for each slot. You may not edit the options for each slot, by creating your own bomb combination for a bomb rack, for example. The loadout options for each slot are set by the plane's creators.

The options include:

Slot List. A list of all available slots for the current plane.

In order to change the weapons carried in a slot, select that slot and open the drop down in the Weapon column which will display all available options.

Slot. The names for each slot.

Weapon. A currently selected weapon options for each slot.

Preset Selection. Drop-down list of all available Weapon Sets for the current aircraft. Choosing an item from the list will populate each weapon slot with the corresponding weapon selection.

Delete. Allows you to delete an existing preset.

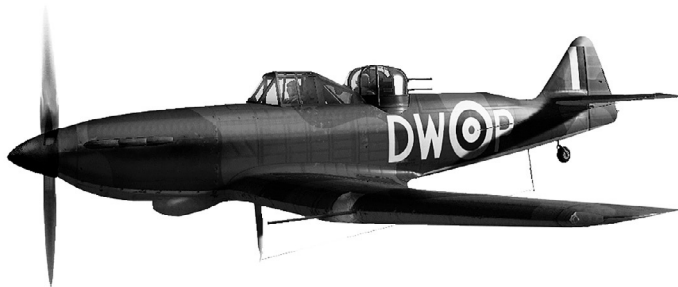
Save As.... Allows you to save the current weapon set under a new name.

Save. Allows you to save the current weapon set under the current name.

Fuel. Allows you to set how full all tanks are on the aircraft. This will evenly distribute fuel among multiple fuel tanks, if so equipped.

Aircraft Weight. A list of all items that add to the weight of the aircraft. Fuel and Weapon (loadout) weights are selected by the player by selecting weapons and moving the Fuel slider. Other weights are standard.

NOTE: Aircraft with Current Weight greater than the recommended Takeoff Weight will find it extremely difficult at best to leave the ground, and will require both an extra long runway and the rock-steady hand of an ace.



LOADOUT - GUNS

Each of the guns carried by your aircraft has a set of options that can be set by the player.

First of all, you can set both vertical and horizontal convergence for each forward-firing weapon. This is a point in space in front of the aircraft at which the guns are aimed.

Secondly, you can fill up the ammo belt for each gun, forward-firing or used by gunners. You can create a belt of any length with any combination of normal, armour-piercing, incendiary, tracer, or other ammunition available for each specific gun.

The ammunition in the ammo belt is cloned, that is, if you only add one round to the belt, the entire belt will be filled up with ammo of that type. If you add four rounds to the belt, then those four rounds will be repeated. So if you want to load up your guns with regular ammunition with one tracer in every three rounds, you have to create an ammo belt that contains [regular round]-[regular round]- [tracer round].

NOTE: Tracer rounds take up certain resources to render, while non-tracer rounds are only tracked in the physics model and not shown visually. Filling up your guns with lots of tracers will use up system resources. Loading only tracer rounds into every gun on something like an 8-gun Spitfire, however impressive, is not something we would recommend. Conversely, slower machines will benefit from using fewer tracers. When running on a less than optimal set-up we recommend loading tracers every fifth or seventh round, and not using them in every gun.

The options include:

Gun Selection. This set of controls allows you to switch between all available guns on the current aircraft.

Gun Name. The name of the slot and the weapon installed there.

Previous / Next. These buttons switch between all weapons on the current aircraft.

Vert Convergence. Vertical offset for the gun.

Hor Convergence. Horizontal offset for the gun.

Belt Area Selection. This drop down allows you to select from two areas of the ammunition belt. This is mainly used to model the historical practice of loading the end of an ammo belt with a string of tracers to notify the pilot that he was out of ammo.

The Main area is the overall fill of the ammo belt and is repeated for as long as there is ammunition in the weapon.

The Residue area is the tail end of the ammunition belt. If it is not specifically set, standard Main fill will be used throughout the belt.

Current Belt. A listing of all ammunition in the belt section.

Bullets. A listing of all available ammunition types that can be added to the belt. The list varies by country and weapon.

Insert / Add / Remove. These buttons are used to fill up the Belt with available ammunition. As you must have at least one round in a belt, you will not be able to Delete the last remaining round. If you wish to replace one round with another, Add a new round first, and Delete the old one afterwards.

Default. Reset recent changes.

Preset Selection. Drop-down list of all available Gun Sets for the current weapon set. Choosing an item from the list will populate each weapon slot with the corresponding gun belt and convergence settings.

Delete. Allows you to delete an existing preset.

Save As.... Allows you to save the current gun set under a new name.

Save. Allows you to save the current gun set under the current name.

COMMON AMMUNITION TYPES

Ammunition in Cliffs of Dover is usually given its historical designation which in some cases may not be overly clear. Here they are described in more detail.

Ammunition	Description
(any) Ball	Regular no-thrills ammunition.
(any) Tracer	Tracer ammunition leaves a light trail in its wake for easier aiming. Some tracers have an option for colour, always shown in the interface.
(any) Armour Piercing	AP ammo will do more damage to harder aircraft components such as armour bulkheads or engines. Depending on calibre it may also do additional damage to armoured vehicles or ships. It will be less effective against softer components such as wood or canvas-covered aircraft parts.
(any) Incendiary	Incendiary ammunition tries to set fire to the target it hits. It is therefore devastating against fuel tanks or ammunition in an aircraft but completely ineffective against armoured components.
(any) High-Explosive	HE ammunition explodes on impact, causing wide devastation around the hit area.
British .303 Observer	Observer rounds were a British alternative to tracers. Instead of illuminating the flight path of the round, Observer rounds break up on impact creating a large visible puff, making it easy to see when you've hit your mark. Observer rounds, however, cause virtually no damage to their targets.
S.m.K.	Regular German ammunition
S.m.K.H	German armour-piercing ammunition
L'spur	German tracer ammunition
S.m.K. Ub.m.Zerl.	German high-explosive ammunition

P.m.K	German incendiary ammunition
Beobachtung	German Observer ammunition
Panzerbrandgranate	German AP-Incendiary shells
Brandgranate	German Incendiary shells
M-Geschoss	German HE shells

LOADOUT - BOMBS

The bombs section allows you to set Detonator options for your bombs. Bomb detonators were usually set by ground crews before missions and were rarely a concern for pilots. Therefore this option is intended for the most advanced player. All intricacies of our detonator model can be disabled with the Realistic Bombing options of the Realism screen.

NOTE: If you wish to enable Realistic Bombing and manually manage your detonators, your bombs will only go off if very specific conditions are met for the drop. Detonators also set bomb delay which keeps it from exploding for a period of time after impact, a very useful feature for low-level bombing. Some detonators come with long delay options that can mean bombs going off after you've left the bomb drop area.

The options include:

Bomb Selection. This set of controls allows you to switch between all available bombs for your current aircraft.

Bomb Name. The name of the slot and the weapon installed there.

Previous / Next. These buttons switch between all bombs available for the current aircraft.

Preset Selection. Drop-down list of all available Bomb presets for the current weapon set. Choosing an item from the list will set all related bomb options for all available bombs.

Delete. Allows you to delete an existing preset.

Save As.... Allows you to save the current bomb set under a new name.

Save. Allows you to save the current bomb set under the current name.

OPTIONS - PILOT

The set of options for the pilot allows you to modify your virtual appearance in the game world. Your pilot model will be seen by all other players online. A wide variety of options allows you to create a unique persona that reflects your own personal taste.

The pilot models are nation specific, and your choices are saved for each nation individually. You will use the German pilot when flying for Germany, and the British pilot when flying for the RAF.

Most of these changes are cosmetic, with the exception of Life Jacket and Parachute selection. If you choose not to wear one, you will not be able to use that item in an emergency. If you choose to go into battle with no parachute for example, you will still be able to bail out, but the results won't be pretty.

NOTE: At the time of writing we are still in the process of developing additional pilot customisation features. Some time after this manual goes to print we hope to release a module that will also allow you to set your pilot's rank - to give him proper shoulder boards or other rank insignia - and to select from a list of historical awards and merit badges to display on your clothing. This manual only describes the features currently available, which include clothing and head selection.

The options include:

Country. The main selection of countries' pilot models to edit.

Body. This currently selects only head models for pilots.

Item Selection. A long list of various equipment areas with a list of available options for each. Some of the items have complex dependencies. For example, wearing some types of flight suits will set your clothes both for your torso and for your feet, and you will not be able to select additional trousers to wear on top of them. Many other items depend on other clothing, such as some oxygen masks requiring a flying helmet. Life jackets can also not be removed if wearing a parachute due to internal game mechanics.

NOTE: Some fans of our previous titles will be upset over the fact that you can no longer put your own texture onto the pilot's face. This is due to greatly increased quality of the head models in Cliffs of Dover. Our older titles had a very generic face that looked OK with virtually any texture.

Cliffs of Dover pilots however have unique facial features that only work with a specific texture. If you were to try to apply your own face to an existing model, you might find your eyes appearing on the pilot's eyebrows and the mouth somewhere in the soul patch area. Since your facial dimensions are most likely different from those of our pilot models, trying to apply your own texture to it Pacific-Fighters-style would look either comical or tragic, and not in any case flattering.



FLYING THE PLANES BASICS OF FLIGHT

The overall forces acting upon an aircraft at any given time are very complex. Getting into complex physics isn't required to become an ace, but understanding the basic mechanics really helps.

If you've ever flown a flight sim before, you've seen the diagram – you know the one: a plane shot in profile, Thrust arrow, Drag arrow, Lift arrow and Weight arrow. Then there's the wing diagram with little airflow lines and the description of the Bernoulli principle.

We won't go down that route.

Instead, here's a quick test to determine whether you should read this chapter. If you've been on the internet in the past ten years, I'm sure you've heard this riddle. There's a plane on a magical threadmill runway. The threadmill defies the laws of physics and can rotate as fast as the plane's wheels while going in the opposite direction. If the plane rolls forward at 10 mph, the runway underneath rolls backwards at 10 mph. The plane's wheels spin up to 200 mph and the runway rolls back at 200 mph. The question is, will the plane move forward and take off or remain stationary?

If you had to think about it for even a second, you need to read this chapter.

The answer of course is yes, the plane will take off as normal.

What pulls the plane forward is its engine. Its wings make it fly. The wings and the engine are unaffected by the ground underneath. As the pilot adds power the propeller blades begin to corkscrew through the air and pull the rest of the aircraft behind them.

That forward motion of the curved blades biting into the wind eventually makes the wings slice through the air so fast the wing begins to rest on the air without the support of the landing gear. Most have played that game while riding a car where you stick your hand out the window, turn it about and feel the air push it up or down. The exact same thing happens to the wing. Go fast enough, and the air begins to push against it and pulls the rest of the plane up with it.

Of course, gravity tries to pull the aircraft down at all times. There's only so much your engine can do. If you point your nose straight up, the engine power will be weaker than the force of gravity and so you won't be able to climb forever. Conversely, point the nose down and gravity will work with the engine to pull you towards the ground.

The air mass around you itself has a very strong effect on the aircraft, both beneficial and detrimental. The air pushing against the wing gives you lift and enables flight. The air pushing against the rest of the plane creates drag that slows you down.

It is the combination of these four forces that acts upon the aircraft. It's important to keep them all in mind when flying. At the controls of a real aircraft those forces make themselves constantly known. An experienced pilot, despite it being a horrible cliché, does become one with his aircraft. The aircraft becomes an extension of his body, and suddenly you are no longer this tiny little soft human but a giant roaring machine of metal. You feel the wingtips shudder, you sense the lift forces under each wing, the engine thrusting you forward, not as something that happens externally, but you feel it in your gut as something that happens to your own body.

That kind of intimate connection with your plane is impossible to create in a sim, save for putting a member of our development team next to you and giving your chair a good kick when your plane approaches stall.

It is however possible to approach total immersion in a flight simulation. Many flight simmers grow to have the same visceral connection to their virtual planes despite the lack of rear-end feedback. Just try to imagine yourself not as the pilot but as the entire airplane, with your mortal shell nothing but a small part of a larger whole.

The most important thing for the pilot to be aware of is his **energy**. An airplane's energy is the combination of its altitude and its speed. Altitude can become airspeed through a simple act of pointing your nose down. Airspeed can become altitude by simply pointing your nose up. Energy is what wins dogfights. If you have more energy than your opponent, you have the upper hand. If you're lower than him or slower, then you're at his mercy.

When flying a multi-engine aircraft, feeling the pull of each individual engine will also greatly help you during manoeuvres or in an emergency.

It is also important to understand that the lift forces act upon each wing separately. Keeping that in mind is an important step to avoiding stalls and spins.

A **stall** happens when the air under both wings can't support the weight of an aircraft. Gravity takes over and pulls the aircraft down. Getting out of a stall means regaining the lift under your wings, and what we need for that is of course some airspeed. So stall recovery is usually as simple as, again, pointing your nose down and pushing the throttle forward.

A **spin** happens when the air under just one wing is not providing enough lift, while the second wing does. This puts the aircraft at a huge imbalance, where one wing is being pushed up and the other pushed down. Spin recovery therefore means somehow twisting an aircraft in such a way as to create an opposing force that will push onto the wings in the opposite direction, and then again, pointing your nose down and regaining some airspeed.

So the basics of flight are after all rather simple. The engine pulls you forward. The wings push you up. A bunch of control surfaces installed all around the plane disrupt the airflow in one way or another. The most important of these control surfaces are:

Ailerons. The large tabs at the outer end of each wing are called the ailerons. When one goes up, the other one goes down. This causes the plane to roll to the side of the lowered aileron.

Elevator. The horizontal control surfaces at the tail of the aircraft cause its nose to go up or down.

Rudder. A vertical control surface at the tail of the aircraft that controls its yaw, or makes it turn left or right in the same way as the steering wheel of a car.

Flaps. Usually large tabs under each wing, these controls increase lift while providing extra drag. They are crucial to low-speed stability, such as during take-offs or landings. At higher speeds however they will greatly slow you down. Deploying them at even higher speeds can even damage or destroy them. Proper use of flaps is what sets a good pilot apart from a great pilot. Most online aces use their flaps during combat to improve their low-speed manoeuvring. This is an essential skill at higher-level play.

Propeller. The propeller blades are of course also a control surface. On most newer planes (by 1940 standards) you have some control over the blade angle which allows you to turn it into or away from the airstream. Think of it as a hand fan. With the fan blade turned towards you, it takes the most effort to fan the air, but it also grabs the most of it. With the fan blade turned sideways it takes the least effort to fan, but also pulls the least amount of air towards your face.

Propeller blades can be turned in exactly the same way; the blade can strike the airstream almost flat, or almost sideways, greatly affecting the resistance it encounters and the amount of the air it bites into which in turn has a drastic effect on its pull. But this is already a more advanced concept of propeller pitch which is described in detail in the next chapter.

Airspeed and Altitude. Another important concept to remember is that the air masses through which your plane flies are not uniform. Most notably, the air becomes more rarefied as you get higher. This means that wings provide less lift and the propeller blades encounter less resistance while also grabbing less air.

Remember that your airspeed indicator is based on air pressure. As your plane goes faster, your aircraft's pressure measuring pitot tube encounters more pressure and rotates the needle on your airspeed gauge. As you get higher, air pressure decreases and the pitot tube encounters less of it, therefore feeding the airspeed indicator with a decreased value.

This means that as you get higher the airspeed indicator will show you airspeed that differs from the actual speed at which your plane travels through the air. These are two very important constants in an aircraft: Indicated Air Speed (IAS) and True Air Speed (TAS). IAS is whatever the altitude indicator displays. TAS is the actual speed of your aircraft through the air, and can be calculated from the IAS using a very simple formula based on your current altitude. IAS is equal to TAS at ground level, while for example 300 mph indicated at 10 thousand feet is actually 360 mph TAS. A sample IAS to TAS conversion table is provided at the back of this manual.

Finally, just as you thought you were getting the hang of it, there's one more airspeed to remember: that's ground speed. True Air Speed is rarely equal to the speed at which your aircraft travels over the landscape, and the reason for that is wind. If you are flying at 300 miles per hour true airspeed with a 30 mph tail wind, you are actually flying at 330 mph over the ground. If you are moving at 300 TAS into a 20 mph head wind, your ground speed is $300 - 20 = 280$ mph. Calculating TAS is much more difficult because wind speed and direction in mid-air are rarely known. To calculate your true airspeed you must instead plot your course over the map, and compare your actual progress with your instrument readings, thus calculating wind direction, speed, and your ground speed.

Weapons and Damage.

Most planes in Cliffs of Dover have forward-firing armament of some kind. Most carry machine guns, others carry cannon, and some even carry both. Machine guns fire large volumes of smaller-calibre ammunition, and cannon lob larger shells at the enemy at a much slower rate.

It is therefore of vital importance to aim for vulnerable areas of your target. Blindly hosing down a bomber can turn it into a tragic-looking hunk of Swiss cheese with no other ill effects. A larger bomber can fly home with a thousand bullet holes in its skin as long as the engines work and the crew is there to operate it.

However a single well-placed round can take out an engine or a pilot and send a brand-new-looking plane crashing into the ground.

It is therefore extremely important to know where the vulnerable areas are. They are usually the crew, the engines, and the fuel tanks. Location of the crew is usually obvious. Many pilots in more modern aircraft are protected with pilot armour with locations that vary between aircraft. Engines are another weak point. Many inline engines can be taken out with a single round; radial engines can take more of a punishment. Few planes in Cliffs of Dover have armour around the engines, so aiming at an engine from virtually any direction will destroy or disable your victim.

Finally, aiming for the fuel tanks is extremely effective as well. When hit with an incendiary round the fumes in the tanks may ignite and instantly destroy your target. When hit with regular ball or armour-piercing ammunition, the effects won't be quite as apparent. However the fuel tank will be punctured and the fuel will begin to leak out. An effective historical tactic was for fighters to pepper bomber wings with holes and leave their target for a minute or two to fill with petrol fumes. Then a second firing pass is mounted which ignites the fumes and destroys the target.

Most larger planes carry fuel in the wings; most smaller planes have fuselage tanks behind the pilot. Many fuel tanks are protected with armour; some are self-sealing to prevent the tactic described in the previous paragraph.

Of course, planes in Cliffs of Dover have a much more detailed damage model than just crew, engines and fuel tanks. Our planes come with over 200 damageable elements. Some of the more complex ones have over 300! Focusing on the crew, the engines and the tanks will help ensure quick and thorough destruction of your target. Sadistic dismantling of various secondary systems that will often have no other result than making the crew really sweat as they come in to land.

NOTE: In contrast with previous Il-2 Sturmovik titles, parked planes in Cliffs of Dover have the same exact damage model as the planes in the air. That means that a quick burst will no longer explode your ground target. The same applies to other targets. The damage model for many vehicles and ships in Cliffs of Dover is as detailed as the plane damage model in older Il-2 titles.

Another crucial element of an effective attack is **convergence**. Described in more detail in the Options section, convergence sets the point in space ahead of your aircraft at which bursts from your multiple guns meet. If you hit your target exactly at the convergence point, it will direct a devastating volume of fire at a specific point. Properly setting convergence and keeping it in mind when firing are the keys to an effective gunnery pass.

FLYING THE PLANES PILOT CONTROLS

Cliffs of Dover models a large number of flyable planes that range from rickety old biplanes to heavy multi-engine bombers. These aircraft come with a wide variety of historical systems that range from the simple to very complex.

Many of these systems are shared between nearly all aircraft, while others may be unique to a specific country or even just one plane.

The controls available are:

Head. You can move your virtual head with the mouse.

There are two mouse look modes in the game, Independent and Legacy. You can switch between them with the **Toggle Independent Mode** key that can be set in the Camera section of the Controls screen (F10 by default). If you rarely use clickable cockpits or the right-click menu, we recommend using the Legacy mode as your primary mode.

In addition to rotating your view, you can also move your head around the cockpit, zoom the camera in and out, and adjust your field of view with the **Hold to Offset Camera, Hold to Zoom Camera, Hold to Adjust Field of View**, and the **Field of View 30-60-90 degrees** commands for the full six degrees of freedom head control inside the cockpit.

See the Controls section for more details.

More advanced players may consider using a head-tracking device or webcam software for an even more lifelike view control.

Stick. Moving the stick left or right controls the ailerons that roll the plane in the corresponding direction. Moving the stick up or down controls the elevator that pitches the nose up or down.

An important moment to discuss here is pilot strength. This is a very important part of the simulation that may not be immediately obvious to newer players. In a real WWII aircraft, the stick is usually connected directly to the control surface via a cable. When an aircraft is in flight, various forces act not only upon its wings to provide lift, but also on the rest of the airframe including the control surfaces. In some cases the air mass can exert great pressure onto a surface which may be too great for an average human to overcome.

For example a high-speed dive can push down on the elevator, or a violent spin can push up or down on the aileron with the force of a hundred pounds or more, while a regular human can do little more than 50 lbs of counter-pressure on the stick. This means that we have to model this virtually. Cliffs of Dover fully models various forces acting upon control surfaces. For example, a joystick in your hand fully deflected down is equal to 50 lbs of pressure. Under normal flight conditions, 50 lbs of pressure is more than enough to fully deflect the elevator, so a fully deflected real stick is equal to a fully deflected virtual stick.

However if you are in a high-speed dive approaching your maximum allowable airspeed the aircraft may need a hundred pounds of pressure or more to pull out. A fully deflected real stick will still apply only 50 lbs of pressure to the stick, so depending on an aircraft you fly it may only push the in-game control column 1/3rd of the way down, or not even move it at all.

This may not always be obvious. There are several ways to gauge the effects of your actions on the in-game controls. You can simply look at the control column inside the virtual cockpit. You can check the position of the control surfaces themselves. Or you can use the virtual controls gauge in the no-cockpit view.

Pedals. Moving the rudder pedals controls the rudder that swings the nose left and right. For pilots who prefer flying with the keyboard there's the Autorudder option (see page [36])

Throttle. The throttle controls engine power. Increase throttle to go faster, chop throttle to slow down. Some throttle levers go beyond 100% for a burst of extra power at the expense of engine temperature.

NOTE: With the Complex Engine Management realism option disabled, the throttle lever / keyboard commands are all that are required to control engine RPM. Otherwise your throttle level will have different effects on RPM depending on aircraft and conditions, and you will need to control Propeller Pitch and fuel Mixture in addition to throttle to fly the aircraft.

Propeller Pitch controls the angle at which the propeller blades strike the air in order to find the most efficient orientation for the current altitude and airspeed. Different aircraft use different prop pitch systems that can greatly vary the piloting technique.

As the propeller blades encounter air resistance while turning, changing the prop pitch will make it easier or harder for the engine to turn. On some more powerful engines, going to 100% throttle at 100% pitch can overrev the engine, that is, make it produce too great an RPM. While brief periods of overrevving are possible, doing it for a more than a few seconds will lead to engine damage.

As diving increases airspeed and puts even more air through the prop, diving at 100% prop pitch will usually overspeed the engine and is not recommended.

Depending on individual aircraft, you may only need to adjust prop pitch once or twice in a mission; others require constant tweaking. Normally you wouldn't use 100% pitch for anything other than take-off and initial climb and then reduce prop pitch to about 85% and further manage it to maintain optimal RPM.

NOTE: You do not need to worry about Prop Pitch with the Complex Engine Management realism option disabled.

Mixture. Depending on altitude the amount of fuel added to the intake airflow needs to be adjusted. More fuel in the mixture makes it rich; less fuel makes it lean. Mixture needs to be richer at lower altitudes and leaner at higher altitudes.

With Complex Engine Management enabled, Cliffs of Dover models realistic changes in exhaust flame colour based on mixture setting. These were historically used to properly set mixture levels. Watching your exhaust takes all the guesswork out of managing your engine!

Proper mixture produces a small amount of blue flame from the exhaust.

When the mixture is too rich, i.e. higher % than needed, the flames will be orange or red.

When the mixture is too lean, i.e. lower % than needed, the flames will be longer trails of blue.

So adjusting mixture is very simple! Just set it a notch below the setting where red or orange flames appear, and that's it! Just don't forget to readjust it as you change altitude, or your engine may stop working at full power.

NOTE: You do not need to worry about controlling Mixture with the Complex Engine Management realism option disabled. Optimal mixture will be set automatically depending on conditions.

Radiator. Most aircraft engines are equipped with radiators that help them remain cool. Opening the radiator may disturb the airflow and slow down the aircraft, so using the radiator to maintain the balance between engine temperature and airspeed is a fine art.

Some engines will run at normal temperature even with the radiator closed when external air temperature is low enough, such as when flying at altitude. Opening the radiator and further cooling the engine in these conditions can be harmful.

Some aircraft are equipped with automated radiators that reduce pilot workload. Radiator automation can usually be turned on and off in case it does not work as needed.

When flying multi-engine aircraft with the Anthropomorphic Control realism option enabled you will need to adjust radiators on each engine separately.

Magnetos. A magneto is an electrical generator that gives power to the spark plug in an aircraft engine.

With **Complex Engine Management** enabled, magnetos are the only way to turn off an engine. Select each magneto on each engine in turn and set it to Off to turn the engines off.

NOTE: Many aircraft usually required ground crews and / or external devices to start an engine. So if you shut off an engine in mid-flight, you may be unable to turn it back on by yourself without returning to a friendly airfield.

Canopy Control. Most aircraft in Cliffs of Dover have openable canopies. Some slide backwards, some open outwards, and other simply have a little side window that can be cracked open.

Many canopies can also be jettisoned in emergencies. Unlike the open – close canopy controls, the jettison command is irreversible. The canopy is discarded and you remain in top-down-convertible mode until the end of the sortie.

Flying with the canopy open increases drag and therefore leads to worse overall performance. However having the canopy open is very helpful on the ground and during take-offs and landings, especially with the Canopy Always On option enabled. With the canopy open, you can move your virtual head beyond the confines on the cockpit, and look around that bulky nose to see the ground. This is almost a requirement in planes like the Bf-109.

Trigger. Different planes have different trigger options, with different weapon types usually assigned to different triggers. This means that in a Spitfire or a Hurricane, each carrying only .303 machine guns, one trigger controls all weapons. In a Bf-109 however, carrying both machine guns and cannon, there are two triggers: one for the machine guns; the other for the 20mms.

Cliffs of Dover allows you to bind a historically less realistic key command to fire both cannon and machine guns with a single trigger (there were however historical cases of aces hot-wiring a single button to fire all armament). This makes it easier to put a full salvo on your target, but is not recommended especially when playing with the Limited Ammo option enabled. Cannon usually carry very limited number of shells, while machine gun ammunition is more plentiful. Machine guns in aircraft armed with cannon will rarely do enough damage on their own. Firing both weapons indiscriminately will often mean wasting all your cannon shells in a couple of seconds, and then flying the rest of the mission with nothing but a couple of puny machine guns that barely dent the paint on your target.

Trim. Trim controls are essential for hands-free flight. Without using trim, you will have to apply constant stick or rudder pressure throughout your mission just to remain straight and level.

Trim is also essential during take off. Depending on aircraft, and sometimes on pilot preference, nose-down trim can be used to help the aircraft raise the tail wheel before leaving the ground, or nose-up trim is used to help it leave the ground. Some pilots prefer to trim their plane so that it will continue to climb hands-off at their preferred airspeed and climb rate.

Rudder trim helps counter engine torque on take off.

Experiment with trim settings during flight. Do not neglect your trim wheels even when flying on more relaxed realism settings as proper trim makes flying much easier.

NOTE: Few aircraft in 1940 were equipped with a full set of elevator, aileron and rudder trim. Some only have two or one trim controls available, and a few may have no trim controls at all.

Landing Gear. Most aircraft in Cliffs of Dover, with the notable exceptions of the Ju-87 Stuka and the de Havilland Tiger Moth, are equipped with retractable landing gear. Important to Raise after you leave the ground, even more important to Lower when you come back to land!

When landing on water, the gear should remain up.

Flaps. Flaps change the wing profile, increasing both lift and drag. Lower them on take off and on landing to help low-speed handling. Raise them for cruise.

Once you begin to get the hang of things, experiment with using flaps in combat. They can help you tighten a turn or avoid a stall, giving you that slither of advantage you need to win the fight.

NOTE: Different aircraft have different flap systems: hydraulic, pneumatic, sometimes even manual. Cliffs of Dover models each system individually, so the amount of time it takes to operate the flaps will vary greatly between aircraft. For example, the flaps are so slow on the Bf-109 that historically pilots would forgo their use for take-off and using them in combat is also almost completely out of the question.

Wheel Brakes. Just like the brakes on a car, aircraft's wheel brakes prevent the wheels from rotating, thus allowing you to slow down. However, unlike car brakes, you cannot slam on aircraft brakes to stop on a dime. As aircraft's centre of gravity is much higher, slamming on the brakes will often cause your plane to nose over. It'll stop on a dime all right, but with the wrong side up!

Dive brake. Most planes designed for dive bombing are equipped with dive brakes. Dive brakes extend from the wings to greatly increase drag and thus slow down the plane in a dive. If you fail to extend them when diving on your target, your aircraft may exceed its maximum allowable speed and break down during the dive, or it might simply require too much force to pull out of the dive and continue flying straight down despite all your strength being applied to the stick.

Impeller. This is officially the device that confused the most beta testers. The impeller is an electrical generator installed on the BR.20 bomber, an extendable propeller on the side of the fuselage that you can toggle on or off. You rarely if ever need to worry about it even when flying the Italian bomber. The device is not installed on any other Cliffs of Dover aircraft.

Fire Extinguisher. Some bombers in Cliffs of Dover have fire extinguishers installed in their engines. These extinguishers have a single charge that sprays down the engine and may put out a fire under favourable circumstances.

Course Autopilot. Many German aircraft are equipped with a complex course autopilot that can guide them to target even when visual navigation is impossible. Not only that, but the system will tell the pilot when to drop his bombs, provided the bomber remains on proper course.

Understandably, the system is rather complex and requires proper set up not only in the cockpit, but most importantly on the ground. The system is based on radio beams projected by multiple ground stations that provide information to the autopilot. The system is only as good as the beams, and they need to be set up by the mission author.

Bomb Sight. While seemingly complex, most bomb sights used during the Battle of Britain were actually rather simple devices.

In essence, a bomb sight is a telescope on a moving mount. The telescope can be pivoted up and down to point at the intended target. Taking the input of altitude and airspeed, the bomb sight can be turned on and it will slowly begin to pan down at the rate determined by the input. If the target remains in the crosshairs, the input is good. If the target slides from under the crosshairs, the input should be adjusted.

When the bombsight reaches a certain angle, which is again based on the input, it will automatically drop the bombs.

See the **Flying the Planes – Bombardier** section below for more details.

Bombenabwurfgeraet. A bomb drop automation device installed on most German planes determines the exact parameters for the bomb drop. Bombs can be dropped in salvos of different quantity and at different intervals. These are usually based on the specific mission you are flying. For example, when bombing a single target such as a building or a ship you may want all your bombs to drop simultaneously with a large salvo size dropped at the shortest interval. When your bombs need to cover a larger area, such as when attacking an industrial area or an airfield, you may want to drop your bombs in smaller salvos spaced out at longer intervals to cause damage over a wider section of the target.

See the **Flying the Planes – Bombardier** section below for more details.

FLYING THE PLANES OTHER CREW MEMBERS

Most multi-crew aircraft in Cliffs of Dover have additional crew positions available to the player. Crew members have the same set of variable skills as aircraft pilots that include Vision, Gunnery, Bravery, and more. A very important point to keep in mind is that a player can operate more than one position at one time. For example, you can jump into a gunner cockpit and operate the turret while still keeping control of the pilot and using your joystick to fly the plane. This can make it easier to evade or hit your attacker.

If you wish to give up flying the aircraft and concentrate on another position, turn on the Autopilot when in the pilot's seat and then switch to your new position.

Cycle between all available positions with the **Next Manned Position** command (C by default) assignable in the Camera Position section of the Controls options screen, or go directly to the desired position with the **Manned Position #x** command from the same section. The most important mannable positions are various gunner turrets that allow you to defend your bomber from enemy fighters, and the Bombardier position that allows you to aim and drop your bombs. They are described below in their own sections.

Additional positions are also available such as the navigator, engineer, observer, radioman, etc. Most of them may have some systems that can be operated by the player. They usually mimic the systems available to pilots of other aircraft. Other positions are simply provided for historical reference.



FLYING THE PLANES GUNNER CONTROLS

Rear gunners serve an important role in a bomber that is perhaps more psychological than physical. A large bomber formation bristling with guns is an imposing target. Fear of a defensive gunner forces enemy fighters to use less direct tactics such as slashing attacks from the sides or head-on passes. Gunners are rarely effective in these situations and hitting the target is often a matter of luck rather than skill. Gunners are therefore not particularly effective, and missions are rare in which bomber gunners bring back multiple victories.

However if the bombers did not have gunners, they would allow enemy fighters to simply park behind the bomber formation and methodically shoot down one plane after another.

So do not expect to rack up kills if you choose to fly as a gunner. You will usually be firing a single low-calibre machine gun that is anything but devastating against a modern fighter. Enemy fighters will be zipping about at sharp angles requiring difficult deflection shots to hit. Hold your fire until you have a good chance of hitting your target. Wait until they get close and little to no deflection is required. Aim for the vital parts: the engine, fuel tanks, and pilot.

Of course, keep in mind that a gunner is high on the priority list of an enemy ace. Gunners are often exposed without any armour protection. Taking out the gunners will leave their plane at the mercy of the attacker. Be prepared to watch those tracers converge on your head. This experience is not for the faint of heart.

We intentionally complicated gunner controls in Cliffs of Dover to better simulate the real workload of a rear gunner, and made it more difficult to aim and fire immediately upon jumping into a gunner position. We feel that human controlled gunners now approach historical results and are much less of a nuisance in online matches.

Still, operating a gunner position takes only a few simple steps. If you're not taking over from an AI-controlled gunner that already used the weapon, you will first need to move the turret from Cruise to Firing position with the corresponding key command.

Then use the **Loosen Shoulder Straps** command to lean to your weapon and keep your head aligned with the barrel. Otherwise your view will be independent of the gun, and you can look around to the sides while moving the gun on its own.

Use the **Snap / Pan** keys to look away from the barrel and look around. When leaning to the gun your head movements will be limited, otherwise you will be able to turn your head much more freely. Use this to look around; turning your view together with the gun is a much less effective way to check for threats.

Most gunner turrets contain two main moveable parts. First is the turret or the gun mount that can be rotated or moved about. On top of the turret or the gun mount is the weapon itself that has its own range of movement.

That is why you have two sets of controls, one for moving the mount, and the other one for the gun. The gun can be moved with the mouse; if you switch into Legacy view mode it will not require you to press or hold any additional keys. Alternatively, you can move the gun with the **Move Gun** key commands assignable in the Turret sections of the Controls options, or assign them to an axis.

The mount is controlled via the **Move Mount** key commands from the Turret section of the Controls options. As most historical gun mounts had to be unlocked before moving and then locked into a new position, there will be a slight delay before a Move Mount command takes effect.

Most gun position in Cliffs of Dover use ammunition magazines. Many of those, most notably on German planes, contain visible ammunition counters. When the ammunition in a canister runs out, the gunner will automatically reload his gun. You can **reload** your weapon manually with the Reload command assignable in the Generic section of the Controls options screen.

Reloading takes several seconds, during which you cannot operate your gun. This applies even with the Limited Ammo option disabled; the option gives you an unlimited supply of magazines, not unlimited rounds in one magazine.

NOTE: AI controlled gunners in Cliffs of Dover will not engage ground targets. While it may seem appealing, historical instances of bomber gunners firing at enemy vehicles were rare, and we feel that it's much more important to conserve ammunition for the eventual encounter with enemy fighters. There is of course nothing preventing you from manually switching to a gunner and engaging any target of your choosing.

FLYING THE PLANES - BOMBARDIER

BOMB DISTRIBUTOR CONTROLS

This is the Bombenabwurfgeraet on the German planes; bombers of other nations have similar controls with less impressive names.

When carrying multiple bombs, the device determines when each bomb is dropped. Bombs are dropped in salvos of one or more bombs, with a certain interval between each salvo.

However the most important feature of a bomb distributor is the **Toggle Bombs Armed** command. Bombs carried by any plane must be Armed. Otherwise you might as well be dropping cartoon anvils.

Even if your plane is not equipped with a bomb sight or a Bombenabwurfgeraet, if it carries a bomb, it must be armed prior to being dropped.

We do not recommend arming your bombs until you're close to your target. If you have to ditch along the way or are hit by an enemy round, an otherwise minor incident will turn your aircraft into a giant fireball if your bombs are armed.

When carrying bombs in multiple locations, you can set options for each one in turn with the **Select Next / Previous Bomb Bay** commands. This also selects external pylons such as the underwing bombs on the Ju-87.

With each location selected, use the **Next / Previous Bomb Distributor Mode** commands to select the appropriate mode for your current mission. Available options differ by plane and loadout.

Then use the **Increase / Decrease Bomb Distributor Salvo Quantity** keys to select the proper salvo size. Finally use the **Increase / Decrease Bomb Distributor Delay** commands to set the interval between each salvo.

With all the parameters set, you may either manually drop the bombs with the **Drop Ordnance (Bombs)** command or work the Bombsight to drop the bombs automatically.

Note that depending on bomb distributor settings, a single press of the **Drop Ordnance (Bombs)** key may drop all bombs or just one salvo, thus requiring multiple presses to empty out the entire bomb bay.

BOMB SIGHT

Many simpler bombers, such as fighter-bombers or dive bombers, do not carry a bombsight. You must instead use your regular reflector sight to aim at the target, or simply drop it in level flight or shallow dive and hope it hits. Larger level bombers do usually carry a dedicated bomb sight.

A bomb sight is a telescope on a moving mount. The telescope can be pivoted up and down to point at the intended target. Taking the input of altitude and airspeed, the bombsight can then be turned on. It will slowly begin to pan down at the rate determined by the parameters into the sight. If the input is correct, the sight will pan at exactly the rate at which the plane is approaching the target and the target will remain in the crosshairs. If the target slides from under the crosshairs, the input should be adjusted.

When the bombsight reaches a certain angle, which is again based on the input, it will automatically drop the bombs so that they will hit the area at which the telescope points.

Operating the bomb sight is easier than it seems. It simply takes some practice and a bit of time to set each mission.

First, line up on your target while at least a few miles away. Give yourself at least 30 seconds to set up your sight, and several minutes if you are only beginning to learn. Trim your bomber for level flight and set your engines to maintain constant airspeed. Switch to the bombardier's position.

Input your current flight parameters into the bombsight. First enter your current airspeed with the **Increase / Decrease Sight Velocity** keys. Then enter your current altitude with the **Increase / Decrease Sight Altitude** keys.

Now is the time to look at the world through the crosshairs. Use the **Loosen Shoulder Straps** command to lean towards the sight and look through the sight optics. The sight will usually be pointing straight down at this time. Use the **Increase / Decrease Sight Distance** commands to pivot the sight up until you are looking at the target, or towards the horizon if the target is too far away.

With the parameters entered and the sight overlay turned on, use the **Toggle Bombsight Automation** command to turn on the sight mechanism and watch it begin to calculate. You can adjust all sight parameters with Automation turned on, including the Distance setting to readjust the sight to point at the target after you modify the input.

If the **Increase / Decrease Sight Distance** commands are too rough and point either above or below the target, point the sight under the target, and wait until it passes through the crosshairs to turn the Automation on.

Note that the **Toggle Bombsight Automation** command puts you into a bomb drop mode. With automation enabled the sight will drop the bombs by itself when it reaches a specific point as set by your input. If you enable automation prematurely, most importantly with Sight Distance set too close, the bombsight may immediately drop the bombs without warning. Make sure the Altitude and Velocity are entered properly, and the Distance setting points at a spot sufficiently far down your flight path before enabling automation or the entire mission will be for naught!

If the target steadily remains in the crosshairs with Automation turned on, the input is good. If the sight pans too slow or too fast, the input needs to be adjusted.

Note that the airspeed input required by the sight must be your current ground speed, which is your True Airspeed adjusted for wind. As you rarely know current wind speed and direction, setting the airspeed properly will often involve some guesswork.

The altitude as well is not quite so easy. It is not your mean sea altitude but rather your actual altitude over target; for example if you are flying at 1000 feet above sea level and the target is at 200 feet above sea level, then you must enter the altitude of 800 feet into the sight. As the target's altitude is rarely known beforehand, getting this parameter right will also requires some trial and error.

If the sight pans too fast and the target in the crosshairs slides upwards, this means that your airspeed input is too high, or your altitude input is too low.

It is extremely important to adjust to the right parameters. While you may achieve the same panning speed with different altitude / airspeed inputs, for example adjusting airspeed to counter altitude errors, the sight also uses these parameters to calculate the proper drop point for the bombs. This will be unique for each airspeed / altitude combination. So you may end up with the sight panning correctly and continuously pointing towards the target until the drop point, while in actuality it is tracking a point in line with your target hundreds of feet above or below it. Therefore the sight will aim to hit that other point in space, resulting in your bombs wildly missing your target.

Finally, if the target slides sideways, that means you are encountering crosswind. Use **Adjust Sight Left / Right** commands to counter crosswind until the sight continues to point at the target. Of course, crosswind also requires some actions by the pilot, usually just some rudder trim. If you allow the wind to continue to push your plane off course, your bombs will miss the target.

Do not forget to arm your bombs! Give yourself some extra time to enter other desired parameters into your Bombenabwurfgeraet if flying a German plane.

Once the sight reaches what it believes to be the optimal drop point it will automatically pickle off your bombs based on your bomb distributor settings.

FLYING THE PLANES - SPITFIRE



GENERAL

The Spitfire modelled in Cliffs of Dover is easily the best air superiority fighter on the British side. Four variants modelled in the simulation vary greatly, most notably in the propeller design. For the purposes of this guide we will describe the most advanced Spitfire mark modelled, the Mk IIa. Fitted with the new Merlin XII engine and a wide-bladed constant speed Rotol propeller, this Spitfire offers the best combat performance.

The most important note about the Spitfire and most other British aircraft of the period is that their engines were equipped with carburettors instead of fuel injection. This meant that negative Gs would lead to momentary fuel starvation and cause the engine to cut out. Simply pushing your nose forward to dive is not a manoeuvre that should be done in a Spitfire, especially with an enemy fighter on your tail. The Spitfire should instead be half-rolled on its back first, thus going into a dive with positive Gs.

PERFORMANCE CHARTS - SPITFIRE

Chart 1. Top Speed

Horizontal Axis: Altitude (m)

Vertical Axis: Top Speed (km/h)

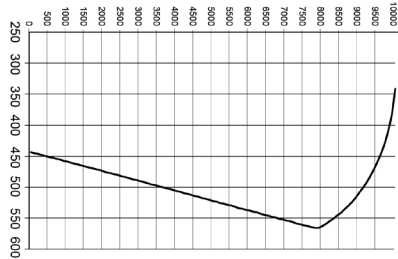


Chart 2. Climb Rate

Horizontal Axis: Climb in m/s

Vertical Axis: Altitude (m)



Chart 3. Climb and Turn Performance

Horizontal Axis: Seconds for 360-degree sustained turn

Vertical Axis: Airspeed (km/h)

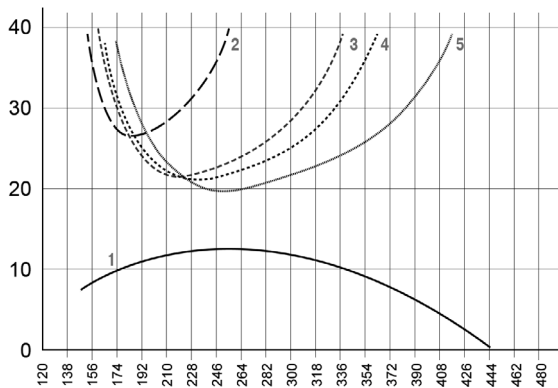
1: Climb rate at sea level (vertical axis is m/s)

2: Landing Flaps

3: Take-off Flaps

4: Combat Flaps

5: No Flaps



FLYING THE PLANES - HURRICANE



GENERAL

A less capable dogfighter than the Spitfire, the Hurricane is perhaps a much better choice for bomber interception. The fighter is a very stable gun platform and requires less effort to fly than the Spitfire. A burst from the Hurricane's machine guns is devastating when it hits at convergence. However prolonged knife fights with BF-108, BF-109, BF-110, should be avoided. The Hurricane survives when it keeps its speed up.

There are few unique features or systems installed in the Hurricane.

It uses standard British engine controls and has a standard set of gauges.

The powerplant and airscrew used in the Hurricane Mk. I DH 5-20 is the same as in the Spitfire, so the same set of instructions apply, including the crucial negative G cut-out warning.

FEATURES

The Hurricane Mk. I (Rotol RMS-7) features a variable pitch propeller with so-called positive course lock. Prop lever controls engine RPM; however when pushed fully aft it locks propeller blades at their maximal course angle, effectively turning it into fixed-pitch propeller. This is used for low-RPM cruise to conserve fuel.

Mixture handle has only two positions marked weak and rich, which are used in situations described above. Adjustment for altitude is automatic.

TAKE-OFF

Flaps two divisions down (about 28%)

Mixture Rich.

Full throttle.

Push control column forward to rotate.

Minimum 80 mph IAS required for lift off.

Gear up immediately; confirm two red lights on indicator.

Flaps can be raised once safe altitude and 90 mph IAS is reached.

CLIMB

Radiator fully open unless coolant temperature falls below 70 degrees C.

Climb at 157 mph IAS, minus 1 mph for each 1,000 feet of altitude, e.g. 145 mph indicated at 12,000 ft.

CRUISE

Economical cruising with mixture lever in “weak” position.

Back prop lever to 0 to obtain positive course lock.

Do not exceed 2,600 rpm.

Never exceed +1 lbs boost in “Weak” mixture.

Move mixture to “Rich” if more boost or more vivid reaction from engine is required.

DESCENT

80 mph IAS optimal with flaps and gear down at engine idling.

90 mph IAS for turns.

LANDING

Open canopy at 150 mph IAS.

Lower landing gear; confirmation - two green lights on indicator.

When below 120 mph IAS, lower flaps to Down position.

Trim to counter nose-down attitude.

Push prop lever full forward. Set mix to "Rich".

DIVE

Trim for level flight. Do not use trim to pull out.

Radiator Closed or Normal.

Never exceed 380 mph IAS.

Never exceed 3,600 rpm.

No more than 20 seconds at over 3,000 rpm.

SPIN RECOVERY

Full opposite rudder.

Gently ease control column forward to neutral.

Aircraft exits spin into a stall. Reach sufficient airspeed before pulling out of a dive.

OPERATING LIMITS

Dive: 380 mph.

Stall:

72 mph indicated with landing gear and flaps up.

55 mph indicated with landing gear and flaps down.

PERFORMANCE CHARTS - HURRICANE

Chart 1. Top Speed

Horizontal Axis: Altitude (m)

Vertical Axis: Top Speed (km/h)

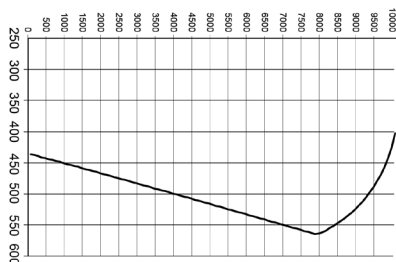


Chart 2. Climb Rate

Horizontal Axis: Climb in m/s

Vertical Axis: Altitude (m)

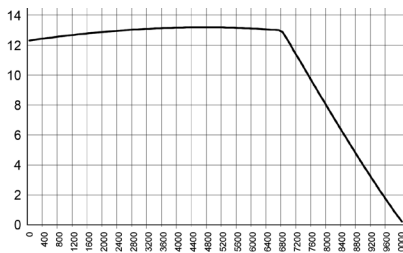


Chart 3. Climb and Turn Performance

Horizontal Axis: Seconds for 360-degree sustained turn

Vertical Axis: Airspeed (km/h)

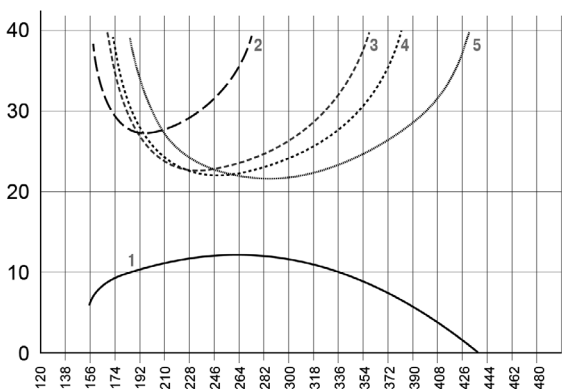
1: Climb rate at sea level (vertical axis is m/s)

2: Landing Flaps

3: Take-off Flaps

4: Combat Flaps

5: No Flaps



FLYING THE PLANES - BF-109



GENERAL

The undisputed king of the skies on the Axis side of the Channel, the Bf-109 is perhaps the most famous Axis fighter of WWII. The E version, nicknamed Emil, is modelled in Cliffs of Dover. Its performance is so evenly matched with the Spitfire, nothing but pilot skill can decide the outcome of an engagement.

The biggest advantage the Emil has over the Spitfire is its fuel-injected engine. It allows you to simply push the stick forward to go into a dive; your opponent has to roll over on his back before following. This makes it a near-perfect evasive manoeuvre that no RAF fighter can follow.

FEATURES

The Bf-109E is equipped with a variable pitch prop. Blade angle is driven by an electric motor.

Blade angle is controlled by the pilot. It is your responsibility to monitor engine RPM at all times.

Prop is controlled in one of two ways, depending on the model.

The earlier Emils come with a cockpit lever marked “**Drehzahl**” (RPM) in the middle of the instrument panel. Push the lever up to “**Grosser**” to increase RPM; lower to “**Kleiner**” to lower RPM. Push the lever all the way down to “**Segelsflug**” to feather the prop.

More advanced Emil variants allow you to control the electric motor directly with two buttons located on the throttle lever. One increases blade angle, the other lowers it.

The mixture handle on the BF-109E operates ignition timing. It only needs to be pushed back during start-up, and left alone at all other times.

Compressor is automatic and has no controls that can be operated by the pilot.

Landing flaps are operated manually via a large turn wheel. It takes a minute or two to completely extend them by hand, effectively preventing you from properly flying the aircraft with both hands when the **Anthropomorphic Control** realism option is enabled. Historically this meant that landing flaps were rarely used by most pilots.

WEP boost is automatically disabled by a clockwork mechanism after 1 minute of use to prevent overheating.

Finally, the aircraft has no rudder trim, as unlikely as it seems. Other than increasing demands on pilot forces at higher speeds, this requires no additional consideration.

START

Trim 0 to +1 indicated.

Prop to Max rpm (12:00 indicated).

Oil and water radiators fully open.

Pitot heating on if external temperature below 0 degrees Celsius.

Gear indicator: both green lamps.

Landing flaps: extended 20 degrees

TAKE-OFF

Initial climb at 250 km/h.

Raise gear.

Raise landing flaps and adjust trim accordingly.

Max 2,468 rpm / 1.45 ATA

CLIMB

Max continuous 2,368 rpm / 1.35 ATA.

Oil temperature: 30 to 75 C, up to 95 in short bursts.

Water temperature: 80 C, up to 105 in short bursts.

CRUISE

Max 2,326 rpm / 1.20 ATA.

STURZFLUG

We could have just titled this section Dive, but doesn't Sturzflug sound so much cooler?

Never exceed 3,000 rpm.

Trim slightly nose-heavy.

Chop throttle to 0.

Prop around 09:30.

Water flap half-open to fully closed in any weather.

Oil and water temperature: never below 40 degrees

LANDING

Approach at 220 km/h.

Prop to 12:00.

Gear: down, 2 green lamps.

Landing flaps: down 40 degrees

Do not exceed 250 km/h with flaps.

Trim nose-heavy for final.

Final at 150 km/h.

OPERATING LIMITS

Landing flaps down: 250 km/h

Landing gear down: 350 km/h

While gear in transit: 220 km/h

Dive: 750 km/h.

PERFORMANCE CHARTS - BF-109

Chart 1. Top Speed

Horizontal Axis: Altitude (m)

Vertical Axis: Top Speed (km/h)

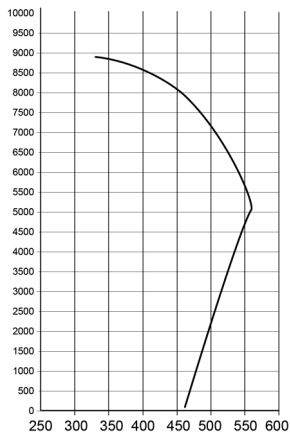


Chart 2. Climb Rate

Horizontal Axis: Climb in m/s

Vertical Axis: Altitude (m)

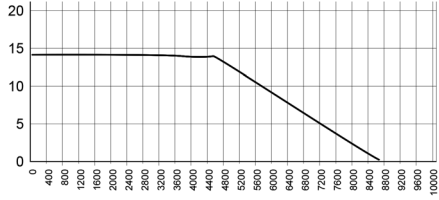


Chart 3. Climb and Turn Performance

Horizontal Axis: Seconds for 360-degree sustained turn

Vertical Axis: Airspeed (km/h)

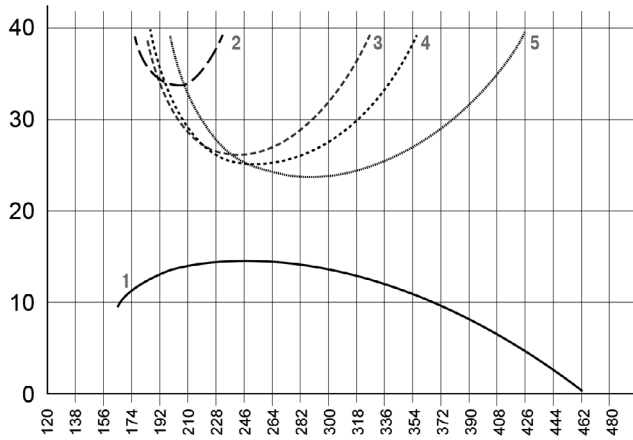
1: Climb rate at sea level (vertical axis is m/s)

2: Landing Flaps

3: Take-off Flaps

4: Combat Flaps

5: No Flaps



FLYING THE PLANES - JU-87



GENERAL

It's pronounced Shtooka, not Stew-ca.

The famous Stuka is designed with a single task in mind: to surgically place a bomb at the precise point it is most needed. The Stuka excels at the job like no other. It is however not particularly fast nor sturdy. Faced with a determined enemy fighter, the Stuka is almost invariably doomed.

Make sure your aircraft is prepared for the dive! Chop throttle, decrease prop pitch, trim elevator if you wish, and, most importantly, extend your dive brake. As the dive brake takes a few seconds to fully deploy, begin preparations for the dive in advance.

The classic Stuka dive starts with a half-roll followed by pointing the nose straight down at the target. Simply pushing the nose down exposes the crew to some negative Gs, but is otherwise a perfectly acceptable alternative. Etchings on the side of the canopy glass provide dive angle reference.

Once in a dive, simply keep your target in the crosshairs and wait. The automatic dive pull-out mechanism will take care of the rest!

FEATURES

The Stuka is equipped with a standard variable pitch propeller. The lever controls engine RPM.

Water and oil radiator are controlled manually. Please note that with the non-pressurised cooling system allowable water temperature drops with altitude.

Automatic-manual compressor control switch is to be engaged in combat only.

The Stuka is equipped with a Reihenabwurfgeraet, an automatic pull-out mechanism. It configures your aircraft for dive bombing and allows for automatic recovery. Once you reach predetermined altitude, it drops the bombs, pulls hard on the stick, retracts the dive brake and returns you to level flight. The mechanism exists because the Stuka can easily exceed comfortable Gs in a pull-out, and without the automated recovery many pilots could black out and crash.

The Stuka is also equipped with a standard Bombenabwurfgeraet. While simultaneous salvo of all ordnance is recommended for most missions, some more free-form sorties may call for separate drops of the main under-fuselage bomb, followed by additional drops of the smaller underwing bombs. Bombs detonators are automatically configured for dive-bombing delay, allowing you to clear the blast zone prior to detonation. See the dedicated Bombenabwurfgeraet section for more detail.

The Stuka is equipped with hydraulic flaps with automatic aircraft balance.

WEP boost is engaged with a simple lever. It is the pilot's responsibility to monitor engine temperature.

The landing gear on the Stuka is fixed and cannot be retracted or extended.

A unique feature on the Stuka is the window in the floor between the rudder pedals that allows the pilot to spot his target. The window can be opened or closed by turning a large knob (hover mouse over Close area at the top or Open at the bottom, and press and hold with the left mouse button). Line up on your target, wait for it to pass under your nose, and then begin your dive once the target appears in the floor window. At lower altitudes the dive should be initiated as soon as the target is spotted.

The rear gunner position is also available on the Stuka. It uses standard gunner controls described above.

TAKE-OFF

Flaps up and dive brakes up.

2,300 rpm / 1.35 ATA allowed for 1 minute.

CLIMB

Standard: 2,100 rpm / 1.10 ATA, WEP off (lever back in “*sturz-reise*”)

Emergency: 2,300 rpm / 1.15 ATA allowed for 30 min.

Climb at 215 km/h indicated minus 10 km/h for each 1,000 m of altitude, e.g. 145 km/h indicated at 7,000 m.

Compressor control in “*Bodenlader*” (manual).

Maximum (do not exceed) water temperature:

- 0 to 3,000 m: 95 degrees C
- 3,000 to 4,000 m: 90 degrees C
- 4,000 to 6,000 m: 85 degrees C
- 6,000 to 8,000 m: 80 degrees C

Oil temperature:

- Minimum: 30 degrees C
- Maximum: 90 degrees C
- Nominal: 70-80 degrees C.

BEFORE STURZFLUG

If you fly the Stuka, you call your diving attack Sturzflug! Alles Klar?

Select bombs with the **Next / Previous Bomb Bay** keys to select which bombs to drop. Wing bomb selection is indicated with 4 red lamps marked “1, etc 2, etc 3, 4” on the bomb panel. Under-fuselage bomb selection is indicated with 1 red lamp on upper bomb panel. Or select both / all.

You must arm your bombs with the **Toggle Bombs Armed** key prior to drop. Bombs that are not armed will go whoosh but not boom.

Alternatively, you can use the **Safely Drop Bombs** button or pull the cockpit lever marked “**Notwurf**” to dump your load safely.

STURZFLUG!

Use the cockpit knob or the **Open / Close Side Window** buttons to open the floor window.

Set pull-out altitude with the **Increase / Decrease Sight Altitude** keys, or the “K” knob on the 2-needle altimeter.

Compressor lever must be set to “**Automatik**” (pushed into panel) prior to the attack.

Bomb automation activates as you extend airbrake. Craft is set up and trimmed for dive. At set altitude selected bombs will be dropped and craft set up for automatic recovery. The automation will disengage as craft reaches level flight.

LANDING

Descend at 1,400 rpm.

Water temperature: minimum 60 degrees C.

PERFORMANCE CHARTS - JU-87

Chart 1. Top Speed

Horizontal Axis: Altitude (m)

Vertical Axis: Top Speed (km/h)

Solid Line: Full Throttle

Dashed Line: WEP

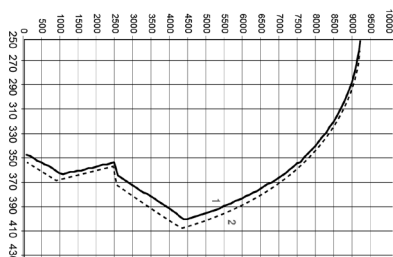


Chart 2. Climb Rate

Horizontal Axis: Climb in m/s

Vertical Axis: Altitude (m)

Solid Line: Full Throttle

Dashed Line: WEP

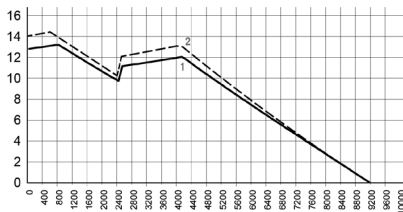


Chart 3. Climb and Turn Performance

Horizontal Axis: Seconds for 360-degree sustained turn

Vertical Axis: Airspeed (km/h)

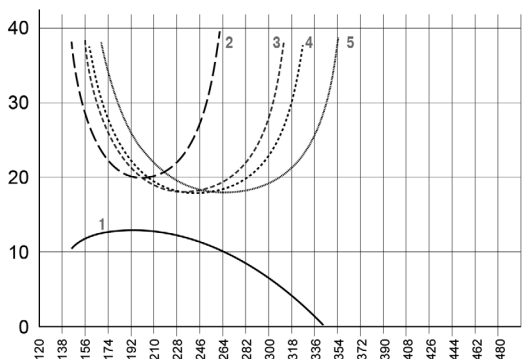
1: Climb rate at sea level (vertical axis is m/s)

2: Landing Flaps

3: Take-off Flaps

4: Combat Flaps

5: No Flaps



PLAYING THE GAME - TRAINING

In the training missions you will be flying a historical WWII trainer aircraft, a de Havilland Tiger Moth. The computer-controlled instructor knows a lot about flying. He will track your progress through each training mission, note your errors, and guide you to correct them. The instructor will also watch out for your safety and do everything in his power not to let you crash, as crashing will of course kill him too. If you do something really dangerous that will lead to an imminent crash the instructor will take over the controls that very instant and try to save you both.

Of course, reading through this manual will do a lot to get you started on flying as well.

After you get the hang of the basics of flight, we highly recommend practicing your aerial gunnery for a while. Some people manage to pull off incredible long-range deflection shots a couple of hours after first trying their hand at a flight sim.

Others like the author of this manual can't hit the side of a barn after a decade of practice and thousands of flying hours.

For the rest of us, there are always bombers.

PLAYING THE GAME - SINGLE PLAYER

The single player section of the game is split up between three main gameplay modes, Quick Mission, Single Mission and Campaign.

Quick Missions are the easiest way to get into a fight. Each mission will consist of at least one group of planes on one or two sides. You can change the number and type of planes in each group, and select which group of planes to fly for.

Single Missions are similar to Quick Missions in a way that they provide you with a specific objective to complete in a specific plane, however they are somewhat larger and are more specifically geared towards a certain plane. However clicking the Customise button in the Single Mission selection screen will allow you to access a Quick Mission-like screen where you can modify various mission parameters.

Finally, the **Campaign** section contains two stock campaigns, one for the RAF and the other for the Luftwaffe that put you through a series of missions in a story format. Players can also create and share their own custom-made campaigns, so this section can be expanded to accommodate additional campaigns made by yourself or downloaded from the internet.

The RAF campaign is more story-driven and provides a very structured experience where challenges increase with each mission. The RAF campaign is not historically accurate. Missions, dates and squadrons are free-form fantasies that are sometimes based on real-world inspiration but never exactly replicate historical events.

In contrast, the Luftwaffe campaign is a very historically accurate experience. Dates, targets, squadrons, and occasionally even aircraft codes and serial numbers, are all based on actual missions flown by the Luftwaffe. While the RAF campaign only allows you to fly fighters in mostly aerial combat missions, the Luftwaffe campaign offers fighters, heavy fighters and dive bombers in a large variety of air-to-air, anti-shipping and ground attack missions which will require a great array of skill from the player.

PLAYING THE GAME - MULTIPLAYER

The multiplayer section of Cliffs of Dover is where the game becomes really challenging. Fighting against AI-controlled foes is hard enough. Going up against another human is even tougher.

Cliffs of Dover uses Steam for its matchmaking. You can also play non-Steam games via LAN or by manually entering server IP. Fans have created external match-making programs for older Il-2 games. It's possible that some of them will support Cliffs of Dover as well, or new ones will be created for it. In short, there are many ways to find an online server. Available servers should offer a variety of Realism options, ranging from fully arcade to fully realistic.

Go into **Multiplayer – Client** to search for servers of various types such as LAN or Internet. Click the **Filters** button to search for servers by name, with a specific number of players, or those running a specific configuration of realism settings.

You can also use the Steam overlay (shift-Tab by default) to connect with friends and access other match-making services.

Once you found a server you'd like to join, click **Join Server**.

Then you will be at the mercy of the server's host. Depending on preference, you may either be given the option of choosing your side and then a plane within it for yourself, or being assigned a side and / or a plane by the host.

If the corresponding realism option is enabled, you may be able to jump into a plane already airborne, as long as it is not occupied by another player. As servers can add new missions or spawn new air groups on the fly, this creates a very dynamic environment and allows you to very quickly rejoin the fray after being shot down.

Otherwise you will be spawning on the ground and either given an optional objective or simply sent out in the world to decide your own destiny. Depending on the server, you may either be joining a highly structured mission-based environment in which players fly in formations, escort and support each other, and engage in complex tactical battles, or fly a hectic spontaneous free-for-all.

So, while the options are great, the principle is simple. Find a server that matches your preference, get into a plane, and fly towards the enemy. And always watch your six!

FULL MISSION BUILDER

The mission builder, while seemingly imposing, is rather simple in concept.

A mission consists of groups or actors that move along predetermined waypoints, executing some task at each waypoint, and proceeding to the next.

Creating a mission simply means setting up these groups and their waypoints, and letting them play it out.

The Full Mission Builder can be found in the Extras section of the main menu. Once it's loaded, open an existing mission or create a new one. To create a new mission, first load a map on which the mission will take place by going into **File – Load Map** menu item and selecting one of the maps from the list.

If you are creating an online mission, we highly recommend using an online map. Trying to fly an online mission on a large offline map such as **English Channel - 1940** will take up a lot of resources and may lead to sluggish performance on slower machines.

With the map loaded, it's time to create some groups! If the **Object Browser** is not already loaded, open it by going into the **View – Object Browser** menu item.

The **Type** tab of the **Object Browser** gives you a selection of all sorts of different objects sorted by type. Some object types can be further sorted by additional criteria, in addition to which you can manually sort the objects yourself if you wish via the **Sort By** dropdown.

The top selection box of the **Object Browser** allows you to select from the main object types in Cliffs of Dover, such as aircraft, ships or buildings. It is a good idea to create some air groups first. Select a plane type in the next combo box down, for example a Spitfire Mk IIa. You are now ready to create a flight of Spitfires.

To add waypoints, hold down the Ctrl key on your keyboard and left-click anywhere on the map. A waypoint is created, and with it, a group of planes at the waypoint. You can Ctrl-click to create additional waypoints in the Spitfire's flight path at this time, or set options for the group first.

With the newly created group selected, the **Object Browser** now contains additional tabs where more properties for the group can be defined. Go into the second tab of the Object window, **Group Properties**, and set up other options for the group, most importantly Hierarchy, Squadron, and the number of planes in the group. These and most other options are similar to those available in the Plane options screen (see above).

Options unique to the Full Mission Builder include the **Callsign** drop down, where the group's callsign is set up; the **Skill** selector, where the abilities of each pilot in the group are determined, and the **Briefing** drop down, described in more detail below.

As you set the number of planes in the group, additional tabs become available for each of the individual planes in the flight. This is where you can set up which plane is flyable by the player in an offline mode. Only one plane in only one group can be set as **Player**. You do not need to set up any planes as Player for an online mission.

Once you are happy with the set-up of the group, it is time to worry about its waypoints. Go into the **Waypoint** tab of the Object Browser, and use the Prev – Next buttons to cycle between available waypoints, or simply select waypoints with the mouse. Ctrl-clicking anywhere on the map creates a new waypoint following a currently selected waypoint which allows you to create intermediary waypoints between the ones already created.

Each waypoint has three crucial parameters. Setting these properly is the key to a working mission.

A waypoint's **Altitude** is the height the plane group will try to reach before flying through the waypoint. If the altitude is unreachable, the group may decide to circle the area whilst trying to climb or dive to it before proceeding to the next waypoint.

The **Speed** is also very important. The group will attempt to fly through the waypoint at the designated airspeed. This is crucial to properly timing multiple groups to meet at the proper time.

Finally, the **Action** drop down selects the group's actions at the waypoint. **Normal Flight** means they decide for themselves. If the skies are clear the group simply continues on. If enemy opposition is detected, the group may decide to engage the enemy or run for home.

The **Take Off** waypoint type can only be set for the first waypoint for the group. This will spawn the planes on the ground instead of in mid-air. The **Landing** waypoint can only be set for the final waypoint in a group's list. If it is set over an airfield, the group will attempt to land there. Otherwise they will look for the nearest available landing area and either find an airfield themselves or simply ditch in the field. The altitude and airspeed values for the **Landing** waypoint are extremely important. These are the values at which the group will set up a landing pattern. We recommend 500:300 for most aircraft. If you set up your landing pattern too high or too low or too fast or too slow, AI-controlled aircraft may end up unable to set up a proper approach.

Intermediary waypoints can be of many other types, giving the group a specific mission to perform.

Ground Attack - Area tells the group to attack the area under the waypoint. Level bombers will carpet bomb it; dive bombers and other aircraft will look for targets of opportunity to hit.

Ground Attack - Target tells the group to attack a specific object. Use the Set button and then select the group's target with the reticule that appears. Note that if you tell a large group to attack a single target, they may split up anyway and attack other targets in the area if they decide that the entire group hitting it would be an overkill.

Engage Bombers tells the group to engage enemy bombers found near the waypoint. The group will ignore enemy fighters unless they are directly threatened.

Engage Fighters tells the group to look for and engage enemy fighters around the waypoint. If none are found, the group will usually ignore other enemy planes in the area.

Free Hunt tells the group to actively look for and engage enemy planes around the waypoint.

Escort tells the group to escort and defend another friendly group. Use the Set button and then select the group's package with the reticule that appears. You do not need to do anything special for the group being escorted.

Cover tells the group to defend the area around the waypoint by intercepting any enemy groups that attempt to enter it.

Note that while it is theoretically possible for a group to perform several tasks in one sortie, the group may decide to treat all subsequent waypoints as **Normal Flight** after a hairy engagement. For example, sending a fighter-bomber group to **Ground Attack - Area** followed by an **Engage Fighters** may, depending on mission outcome, lead to inconsistent results each time the mission is played. We generally recommend setting only one Attack-type waypoint for the group. Multiple Escort waypoints however are perfectly OK, and should be used to set up a long escort mission.

So, while all this took a few pages to describe, actually setting up a flight path for a group can be done with just a few clicks. Select a plane, set up waypoints, set the first and the last to **Take Off / Landing**, set one of the intermediate waypoints to be some sort of an attack, set the number of planes in the group, and you're all set!

When setting up a mission with multiple plane groups, timing is the key to ensuring they do exactly what you need them to. You can test your mission at any time via the **File - Play Mission** menu item. Run the mission through on autopilot at accelerated time and ensure the groups meet when and where you want to meet, and if they don't, adjust their waypoints accordingly.

After you have your air groups set up, it's time to populate the world! Add ships, vehicles, tanks, and other objects as you see fit. Most of them have a set of simple parameters similar to those of an Aircraft group both for the group and for their waypoints.

Finally, go into **View - Mission Parameters** menu item to set up the **Time** when the mission takes place and overall weather across the map.

A complex **Briefings** feature is provided with the Full Mission Builder. It can be accessed from the **Edit – Briefings** menu item.

Multiple Briefings can be created for each mission, and assigned to various groups and even individual planes as the mission author sees fit; for example creating separate briefings for the bombers and the fighters, giving each element in a fighter group a unique task, and further giving more detailed briefings to each flight leader. These are most useful for online missions or when creating your own Quick Missions.

Creating briefings is very simple. First, click on the **New** button. In the New Briefing window that pops up, select **Regular** for a generic pre-flight briefing; **Info** for a pre-mission summary shown at mission selection; **Mission** for the overall summary shown to online players before they select a side; and **Army xxx** for the country briefing shown to players who select their side before they select an individual plane.

After selecting **Briefing Type**, simply give it a descriptive name in the box at the top, and type or paste in a briefing into the larger box in the Briefing window. Repeat for any additional briefings.

With all briefings created, hit the **Save** button in the Briefings window and open the Object Browser. Select the plane group to which you wish to assign the briefing. Select a briefing from the list in the **Group Properties** tab to assign a briefing to the entire group, or assign it in the **Briefing** drop-down of each individual group member to personalise briefings further.

You can create **New** briefings, **Delete** existing ones, or click on a briefing to edit it at any time.

A complex Scripting feature is also provided which allows you to set your own mission goals and directly cause events in a mission. As using them requires some knowledge of programming, their description exceeds the scope of this manual. We plan to release a comprehensive guide to Triggers and Scripting at some point after the game is released.

STRATEGY AND TACTICS

A point of crucial importance is that Cliffs of Dover intentionally deviates from historical 1940 tactics in its single-player mode. By the start of WWII aerial combat has greatly progressed since dogfights of WWI and was no longer a series of chivalrous 1-on-1 battles. WWII as a whole, and the Battle of Britain specifically, were about group tactics. A formation of fighters working together and equipped with good radios was superior to a gaggle of highly-trained aces fighting individually. This was especially apparent during the early days of the Battle of Britain when the British still used obsolete and unwieldy fighter Vics, while the Germans used their brand new Finger Four formation that allowed for much more fluid and flexible combat. The British quickly learned from their mistakes and adopted the Finger Four for themselves by the end of the battle.

While that is generally modelled in Cliffs of Dover, and the Germans use Finger Four while the British begin the battle with Vics and the progress to four-plane formations, we strongly felt that we did not want to make a single-player game about group tactics. Most of us at Maddox Games, and most of our old fans enjoy the good old-fashioned knife fight. This is why AI-controlled enemies are not adverse to breaking away from formation and duking it out one-on-one.

Therefore this guide as well is not about complex group tactics, but rather about winning one-on-one battles. These apply equally to offline and online dogfights.

The tactics described here also use a more modern understanding of aerial combat and use some terms that may not have been known in 1940. While describing 1940 tactics would have been a great exercise in historical accuracy, learning and living by them would put anyone at a huge disadvantage in an online environment by putting you 70 years behind your opponent!

Preparing for battle. First and foremost, be on a constant lookout for enemy planes, from the moment you take off to the moment you land.

If you do spot the enemy early enough, it's not always a good idea to head straight into battle. Take the time to profit from sighting the enemy early and put yourself in the most advantageous position for attack. Take some time to gain altitude and airspeed while approaching or even flying parallel to the enemy. Even if the enemy is heading straight for you, spend some time gaining that energy while they're outside the firing range.

However if you are up against enemy bombers, you must often trade surprise for urgency. What good is coming in unnoticed if the enemy has time to bomb their primary objective? All considerations should be thrown out the window, and placing that bomber in your crosshairs and pressing the trigger should be your only goal in life.

Same goes for escort missions. If you are defending friendly bombers, head straight for the enemy and prevent them from attacking the bombers.

Destroying Your Target. Some manoeuvring is usually required to line up a shot. The best shot is a no-deflection shot directly from behind, that is from the target's six o'clock position. Even in a manoeuvring knife fight, your job is to get on his six and stay there until you have a shot.

Doing that can take several exciting, excruciating, nail-biting minutes – or just a few seconds. You will have to execute a series of manoeuvres that will often be born on the fly and have no textbook definition. These are described in more detail below.

Now imagine firing at a small manoeuvring target hundreds of meters away, while both you and the target are flying at 300 miles per hour.

It's not impossible, but it is very difficult. Many young pilots return from their first missions with empty ammo stores, but not a single hit on an enemy aircraft. Only constant practice and unwavering confidence can help you score your first combat kill.

Getting Out. Success in this task depends largely on how well you fared in the previous three. If you missed an enemy target in the first stage, you risk getting shot out of the sky by an unseen opponent. If you came in clumsily and ended up in the midst of an enemy formation, you're as good as dead. And if you missed your target when you fired at it – you have yet another angry pilot in pursuit.

MANOEUVRING

The key to choosing the proper manoeuvre is understanding your plane and that of your opponent. Knowing your own plane is crucial. Study performance charts. Know your best turning speed at a given altitude; know your best climb rate. Fight within the most advantageous envelope.

Otherwise, your job is to get onto your opponents six, or better yet, his high six, a position behind and above him. He will be actively trying to deny you that chance. That is, at core, a geometric problem. You must draw a figure in the sky that puts you at a specific point behind the figure being drawn by the enemy.

The problem is knowing where to point your lift vector, and where to point your nose, both in relationship to your opponent.

Your **lift vector** is the direction of the lift force acting upon your aircraft which is often, but not always, a line pointing straight up and parallel to your rudder. Controlling your lift vector relative to that of your opponent is the key to proper flight manoeuvring. This simply means looking at the rudder of your opponent, visualising your own rudder, and lining them up according to plan.

Direction of your **nose** relative to your opponent is the second crucial element. Sometimes you want your enemy above your nose, sometimes below, and sometimes to the side.

This brings up to a concept of a **lead** and a **lag pursuit**. Again, this is very simple. Pursuit is just another word for turn and is used to avoid confusion as it applies to both vertical and horizontal turns. Lead pursuit is the most common type of pursuit, where you are pulling your nose ahead of your opponent. Lag pursuit is the opposite, your nose pointing behind your opponent. There's also a **pure pursuit**, where you are pointing directly at the enemy. Lead pursuit is what you should strive to do the most of.

With both of you turning, you can be on the inside or the outside of the opponent's turn. The simplest way to determine is to look at his wing. If you see the top side of his wing, you're on the inside of his turn. If you see the underside, you're on the outside of the turn.

Finally, your relative **energy states** are also important. In addition to throttle, your other ally is gravity. Use it well. Up is slower, down is faster.

The rest is fluid. The position you want to be in is in a lead turn, with higher energy, inside his turn, and with lift vectors lined up.

To get to that point you may have to improvise and mix up some manoeuvres on the fly. It's best not to think of yo-yos and turns and barrel rolls. Think of lift vectors and energy states. Once you begin to see dogfights along those lines, everything will become very simple.

SAMPLE IAS TO TAS CONVERSION TABLE

These are estimates. Standard temperature readings at altitude used; actual temperature will vary, therefore affecting actual TAS.

Imperial (speed in mph, altitude in feet)

Feet Mph	3,000	6,000	8,000	10,000	12,000	14,000	16,000	18,000	20,000	22,000	24,000	26,000	28,000	30,000
150	157	164	169	174	180	185	191	197	203	210	216	223	230	237
200	209	218	225	232	240	247	255	263	271	280	288	298	307	317
225	235	246	253	261	270	278	287	296	305	315	325	335	345	356
250	261	273	282	290	299	309	319	329	339	350	361	372	384	396
275	287	300	310	319	329	340	350	361	373	385	397	409	422	435
300	313	327	336	346	357	367	378	390	401	413	426	438	451	465
325	339	354	364	375	386	398	410	422	435	448	461	475	489	504
350	365	381	392	404	416	428	441	454	468	482	496	511	527	542
375	391	408	420	433	446	459	473	487	501	516	532	548	564	581
400	417	434	446	459	472	485	499	514	528	543	559	575	591	608
425	442	460	473	487	501	515	530	545	560	576	592	609	627	644
450	468	487	501	515	530	545	561	577	593	610	627	645	663	682
475	495	515	529	544	559	575	592	609	626	644	662	681	700	720
500	521	542	557	573	589	606	623	641	659	678	697	717	737	758

Metric (speed in km/h, altitude in metres)

Metric km/h \ Metres	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
200	210	220	232	244	257	271	286	301	317	334
250	262	276	290	305	322	339	357	376	396	418
300	315	331	348	366	386	407	428	451	476	501
325	341	358	377	397	418	440	464	489	515	543
350	367	385	404	425	448	471	496	521	549	577
375	393	413	433	456	480	505	531	559	588	618
400	419	440	462	486	512	538	566	596	627	660
425	446	468	491	516	544	572	602	633	666	701
450	472	495	520	547	576	605	637	670	705	742
500	524	549	575	604	634	666	699	734	771	810
550	576	604	633	664	698	733	769	808	848	891
600	628	658	690	725	761	799	839	881	925	972
650	681	713	748	785	825	866	909	955	1003	1053

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TECHNICAL SUPPORT

If you experience difficulties playing your Ubisoft game, please contact our 24-hour online solution centre at **<http://support.ubi.com> first.**

Our Support team can be reached on **0871 664 1000** (national rate) between 11am and 8pm, Monday to Friday (excluding bank holidays).

PC Game: If you are experiencing difficulties running your PC game, please contact our support teams before returning the game to a retailer. When calling us, please ensure you are situated at your PC with the game already installed so that we can troubleshoot for you.

Alternatively, if contacting us by webmail, please attach your operating system file (dxdiag) to your incident so that we are aware of your system specifications. If your screen returns to the desktop, freezes with jerky graphics or you receive error messages, we will need to see this file, as there may be a discrepancy between your operating system and the required game specifications.

To find your dxdiag file

Windows XP: To open your DirectXDiagnostic tool, go to the Start menu, choose Run, then type dxdiag in the white box and click OK. Click "Save information..." to save a text file with the necessary information.

Windows Vista: go to the Start menu and type dxdiag in the search bar to locate the file. Save this file to a convenient place on your PC so you can send it as an attachment when contacting us by webmail.

If you need any help with this procedure, please call our support team for assistance. One of our agents will be happy to assist you.

Faulty Game: If you believe your game is faulty, please contact our support team before returning your product to the retailer.

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If your receipt has expired and you are within the 90-day warranty period, please contact the Ubisoft support team for verification.

Please note that we do not offer hints & tips at our technical support centre. These can usually be found free of charge on the Internet.

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